frontiers | Research Topics

Language and culture in organization and consumer behaviors

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Language and culture in organization and consumer behaviors

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Editorial: Language and culture in organization and consumer behaviors

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Editorial on the Research Topic
Language and culture in organization and consumer behaviors

1. Introduction

Language and culture can have a profound effect on organizational strategy, organizational behavior and consumer behavior. In daily life, language is the basic tool for human communication, while culture shapes the values, beliefs and behaviors of individuals (Arno, 2003). In the field of organizational strategies, the differences in language and culture affect companies' decisions and operations in cross-cultural environments (López et al., 2017). Companies with cross-cultural businesses need to focus on the adaptability of organizational strategies in terms of language barriers, cultural differences and communication styles to ensure their effective implementation. In the field of organizational behavior, the selection and application of language in multilingual environments can affect the effectiveness of collaboration and the quality of communication within teams (Lee and Kramer, 2016). Companies need to promote cultural sensitivity and develop cross-cultural communication skills to establish multicultural work environments which will promote teamwork and enhance employee satisfaction. Furthermore, in the field of consumer behavior, language and culture can have a significant impact on consumer needs, preferences and purchasing decisions (Dey et al., 2020; Li et al., 2021; Ye et al., 2023). When marketing and positioning products, companies need to take into account the linguistic and cultural context of target consumers to provide products and services that meet their needs and values. Thus, it is important to understand the impact of language and culture on organizational strategy, organizational behavior, and consumer behavior (Sugita and Takahashi, 2015), and in this regard, our research group examines the impact of language and culture on organizations and consumers from multiple perspectives, including psychology, sociology, and organizational behavior.

Manuscript review is a key quality control step aimed at ensuring that journals publish only high-quality, original academic research. Our research group adheres to the standards of high efficiency and quality in reviewing. According to our past experience, it takes the following processes from the manuscript reception to the paper publication, which usually takes 2–3 months. To begin with, our research group receives the paper and conducts an initial assessment, which is to check whether the paper meets the journal's subject scope and basic requirements, as well as formatting and writing standards, and to make corresponding suggestions for the authors to modify their paper. Next, our research group assigns the assessed papers to at least two external peer reviewers to perform close reviews, evaluating their academic quality, methodology, data analysis, results and conclusions, and to make corresponding comments ask for further revision of the paper. Afterwards, the editorial board evaluates the revised paper to ensure that the authors have adequately responded to the reviewers' comments and made appropriate refinements. After proper modification, the paper is then submitted to the editor-in-chief of the journal for final review. Generally accepted papers are characterized such as high academic quality, great originality, methodological rigor and well-defined conclusions.

There are three general types of manuscript rejection in our research group, which are desk rejection, rejection after initial assessment and rejection after peer review, and the percentages of the three cases in the previous review process respectively are 33%, 56% and 11%. The papers with desk rejection generally have the following two problems: first, the paper is outside the scope. Second, the paper has serious academic problems, such as inappropriate methodology, untrustworthy data, and flawed research design. The above problems may lead to unreliable or non-reproducible conclusions, so an immediate rejection is carried out. Papers rejected after initial assessment generally have the following two problems: first, the paper is insufficiently revised. Second, there are persistent academic problems. The paper fails to solve the academic problems after the initial assessment. There are relatively minor percentage of papers rejected after peer review. The rejection was generally due to the paper still can't meet the journal's requirements after the third round of revision, including flaws in methodology and poor statistical analysis. Our research group will justify the rejection of each paper and give the author detailed feedback to encourage improvement and following high-quality research.

At present, our research group has a total of 25 related papers, concerning the influence of language and culture on organizational behavior, consumer behavior, and their internal mechanisms. From the perspective of culture, they explore the fields such as cultural resources (Zhou et al.), consumer behavior (Zong et al.; Cai and Yu), value co-creation (Yang et al.), tourism (Tuo et al.), social governance (Li et al.). From the perspective of language, they explore the impact of film language (Zeng et al.), language of e-commerce livestream anchors (Ma et al.), visual language (Leng et al.), social media language (Guo et al.) on consumer behavior and learning performance. Above studies will help researchers with same pursuit to better understand the role and function of culture and language in different fields.

In order to better grasp the overall framework and to explore into new research directions and intersections, this paper initially sorts the basic ideas of all published papers and conducts an in-depth analysis of 25 existing papers, using the LDA topic model to reveal the underlying topic structure of the existing research (Blei et al., 2003). First, the researchers pre-processed the text of 25 papers, including removing stop words (such as "the," "and" and other function words), punctuation marks and numbers. Next, performing stem or lemmatization. The researchers transformed the words into their basic forms to minimize the effect of inflections. And then, the bag-of-words model is formed. The researchers then further construct the topic model and determine the optimal number of topics through the perplexity and coherence score. At last, the topic modeling visualization is guided through the PyLDAvis, and yields the keywords and their weights under each topic (Jelodar et al., 2019).

2. Laws between the culture and language of companies and the behavioral performance of consumers

2.1. Interesting diversity of topics

For the preliminary analysis of the 25 existing papers in our research group, there are multi-disciplinary and multi-perspective studies of language and culture in both organizational and consumer behavior. From the perspective of language, studies have explored the mechanisms by which vloggers' language affects consumers' purchase intention (Sheng et al.), tactile compensatory effects of visual language on web products (Leng et al.), relationship between dialects and total factor productivity of companies (Xiong and Chen). Studies have validated the impact of an online instructional intervention on college students learning performance of foreign Language during COVID-19 (Xu and Zou), and the dual mediating effect of vloggers' persuasive strategies on consumers' purchase intentions (Sheng et al.). Additionally, there are studies that point out social media marketing and brand equity enabling student behavioral engagement in the higher education (Ruangkanjanases et al.). There are also studies investigating the role of visual language in the online relationships and in constructing images of urban spaces (Liu et al.). From the perspective of culture, some studies have explored the mechanisms between cultural values and consumer behavior (Yang et al.), the relationship between culture and hierarchical medical systems (Tao et al.), and the impact of culture on public services motivation (Duan et al.). Some studies confirmed the resource curse in Chinese culture, revealing that cultural resource endowment could be counterproductive to a certain degree (Zhou et al.). Whereas, studies based on the theory of planned behavior explored the mechanism of consumer purchase intention in traditional culture (Zong et al.), others analyzed the impact of value co-creation on consumer citizenship behavior from a consumer perspective (Yang et al.). There are also studies that have explored the influence of culture in fields such as donation behavior (Wang et al.), movie-induced tourism (Zeng et al.; Lao et al.), and live e-commerce anchors' language appeals (Ma et al.). In addition, there are also studies that connect language and culture at the same time, exploring how they jointly influence consumer behavior and organizational behavior. For instance, the moderating role of cultural differences between on-camera language and linguistic landscapes has been verified, and the empathic mechanism of movie-induced tourism has been explored (Zeng et al.). From the perspective of content creators, there are research analyzed the

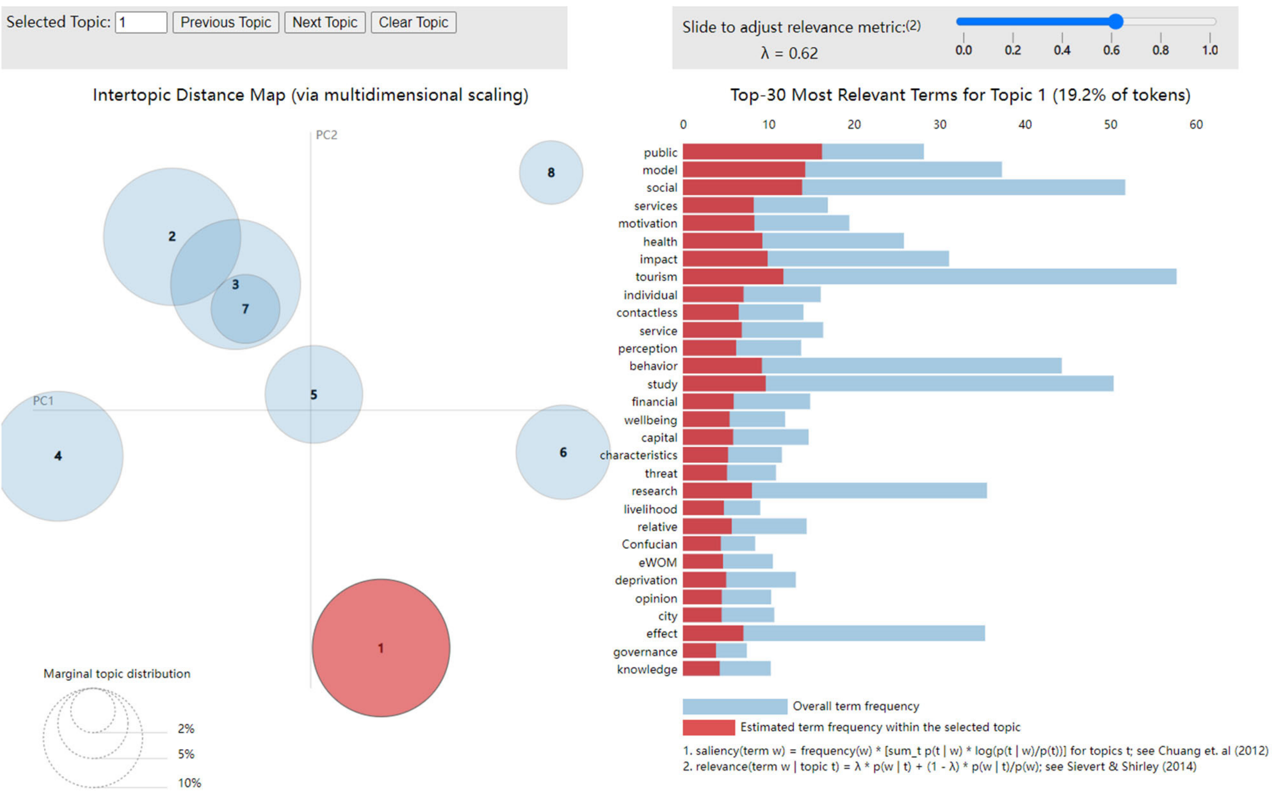

FIGURE 1
Distribution of LDA topic model.

impact of the co-created cultural and linguistic communities by creators and consumers on the consumer behavior (Ren et al.).

2.2. Intersection of Research Topics

In order to have a more in-depth understanding of the topic distribution of the existing papers, discover the key topics in the proceedings, mine some new research directions and potential intersections, this paper has employed the LDA topic model to analyze 25 papers, and the results are as follows. First, the perplexity and coherence score were used to judge the optimal number of topics. According to the corresponding curve, it can be seen that the perplexity has the lowest value, and the coherence score has the highest value when the number of topics is around 8 (Hannigan et al., 2019). Therefore, the number of papers related to the topic in this research is determined to be 8. Next, the LDA model is used for visualization, and the results are shown in Figure 1. In the distribution diagram of LDA topic model, one circle represents one topic, and when the number is 8, those circles are basically dispersed and partially intersected, which indicates that the number of topics can cover most of the contents of the existing research texts, and the topic modeling is good (Park et al., 2019). Circles 1–8, respectively correspond to the topics "Culture and Social Interaction," "Diversity of Cultural Resources," "Language Culture and Tourism," "Language and Social Interaction," "Language and Cultural Interaction," "Culture and Consumer Experience," "Culture and Tourism Experience," and "Language and Education." The LDA topic model distribution diagram shows the correlation and independence between each topics. Although some of the topics in the distribution diagram overlap to some extent, overall the topics are relatively dispersed in the topic space, which reflects the diversity and broad coverage of the collection of existing studies, with each topic in the diagram representing a different issue or research field (Du et al., 2020).

It can be drawn that the topics in our research group have a distinct intersectional pattern, exploring the mechanisms of linguistic and cultural influences from different fields as follows. First, in the field of marketing, some studies explored the effects of traditional culture and value co-creation on purchase intention, donation behavior and consumer intentions to pay a premium. Second, in the field of tourism and culture, some studies examined from the side of short videos (Qin et al.), movies, tourism public opinion management, and cultural heritage narratives, exploring the role of language and culture in promoting cultural tourism and shaping the spatial imagery of cities. Third, in the field of education, many studies have discussed the impact of online teaching on student performance during COVID-19 and the role of social media marketing in higher education. Fourth, some studies have examined the impact of relative deprivation on health inequalities, and factors influencing behavioral intentions to use contactless financial services in the banking sector, concluding that the impact of language and culture has extended to the health sector (Tao et al.), as well as the financial services sector (Chen et al.).

Consumers can be found in different fields and are accompanied by consumption behaviors, so the influence of language and culture on consumer behavior in existing studies can be summarized in two aspects. On the one hand, language and culture can have an impact on consumers' brand preferences and purchase decisions. Consumers from different linguistic and cultural backgrounds have differences in their demands and preferences for products, brands, and services (Torelli and Stoner, 2019). Understanding and adapting to the linguistic and cultural characteristics of consumers can better meet their needs and boost their purchase intentions. On the other hand, language and culture can work on advertising and marketing. The linguistic and cultural background of the target consumer needs to be taken into account in advertising and marketing to ensure that the information conveyed correctly (Gong et al., 2022). The use of specific language, signs, symbols and cultural elements can be effective in capturing the attention of consumers and creating emotional connections.

In the context of globalization, cross-cultural communication is made more important (Peng and Wu, 2019). In the process of international market expansion, the differences in language and culture will have an impact on business negotiations and customer relations and so on. With the diversity and internationalization of the market, providing multilingual services and localized experiences becomes an important strategy to attract consumers (Zegers and Auron, 2022). Consequently, subsequent research could focus more on the impact of cross-cultural communication, language services and localization on aspects such as organizational or consumer behavior.

3. Future research

The general pattern of our research group provides a glimpse of the direction for future research. First, researchers need to examine the impact of language and culture on organizational culture, employee motivation and knowledge sharing to enhance organizational performance and employee satisfaction. Second, researchers need to further study the role of language and culture in social interaction such as education, social governance, political identity and social capital construction in order to promote harmony and development. Third, researchers need to explore the application of language and culture in the field of digital technology, such as artificial intelligence and virtual reality, in order to improve the interactivity and user experience.

The intersection between language and culture and digital technology presents many opportunities and they will also become more prevalent and important in modern society (Lee and Daiute, 2019; Lee et al., 2023; Lyu et al., 2023). On the one hand, with the development of digital technology, the corresponding products and services are launched to the global market, so companies need to consider the user experience from different languages and cultural backgrounds (Guy, 2019). Research on the intrinsic relationship between language and culture and consumers of digital technology can ensure that digital products match the habits, values, and communication styles of consumers from different cultures and provide a better user experience. On the other hand, the development of digital technologies has provided new means for the preservation and presentation of cultural heritage, among other things. Virtual reality and augmented reality technologies provide users with immersive experiences, in which linguistic and cultural elements are incorporated to enable them to experience environments, art and literature produced by different language and culture, in a more intuitive and immersive way (Yeh et al., 2020). Thus, studying the mechanism of the influence of linguistic and cultural elements on the virtual experience, and integrating the two can enhance the user experience, as well as allow for a more targeted preservation and wider dissemination of culture. Not only that, social media provides a platform for people to communicate and interact globally, and language and culture play as a tool for users to express their opinions and share their culture (Yeh and Swinehart, 2020). It can be seen that the intersection of language and culture and social platforms can bring new opportunities for cross-cultural communication and cooperation (Abubaker et al., 2020). The intersection between language and culture and digital technology brings not only globalization and cross-cultural communication, but also new opportunities and challenges (Martínez-Caro et al., 2020). Fostering the intersection can fully exploit the potential of both and promote cross-language and cross-cultural digital development.

Author contributions

KY: Conceptualization, Data curation, Project administration, Software, Writing—original draft. XL: Investigation, Methodology, Resources, Supervision, Writing—original draft, Writing—review and editing. TS: Data curation, Formal analysis, Supervision, Writing—original draft. QZ: Formal analysis, Funding acquisition, Resources, Validation, Visualization, Writing—review and editing. LP: Data curation, Methodology, Project administration, Supervision, Visualization, Writing—review and editing. LZ: Conceptualization, Investigation, Methodology, Supervision, Writing—review and editing.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Dual path mechanism of promoting classical furniture and customer responses: From the perspective of empathy

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The correlation between empathy and customer responses may be a key to solve the problem of classical furniture advertising design. To explore the relationship between empathy and consumer purchasing response, this study proposes a model of dual path mechanism of empathy influencing consumer purchase intentions in classical furniture through advertising design related to furniture brand Tanjuyuan. The results not only prove the hypotheses, but also indicate that: (1) cultural empathy and empathy fusion have a more significant impact on consumers' purchase intention than practical empathy; (2) cultural empathy plays a dominant role in influencing consumers' purchase intention; (3) empathy fusion is a key mediator between cultural empathy and practical empathy in influencing consumers' purchase intention. These findings provide issues for subsequent research from various perspectives, such as enhancing the practical perceptions of consumers of classical furniture products, cultural value perceptions, and the interdisciplinary application of empathy.

KEYWORDS

classical furniture, furniture brand Tanjuyuan, practical empathy, cultural empathy, customer response

Introduction

Empathy may be a key to the design and promotion of classical furniture advertising. Classical furniture advertisement is usually designed to change consumers' original cognition of classical furniture products, control consumers' emotions, and further achieve a change in consumer behavioral decisions. Advertising designers should recognize that consumer behaviors are influenced by the design and promotion of their advertisement. With the coming of consumer experience-centered era, factors that influence or determine consumer behavior decisions are also gradually changing (Deng et al., 2022; Li et al., 2022; Wang et al., 2022). When purchasing classical furniture products, consumers shift their attention from product attribute to value attribute, and the increasing consumption awareness makes consumers pay more attention to the emotional experience in shopping process. However, existing advertising promotions still have not realized the change of focus from product to people. Furthermore, the decision-making process of consumer, considered as the black box of consumer psychology, reflects consumers' mental activity and has a key impact on marketing activities (Shaw and Bagozzi, 2018; Li and Katsumata, 2020; Li et al., 2021a,b). Therefore, the key issue in the design and promotion of classical furniture advertising is how to create content that could stimulate consumers' purchase intention.

In recent years, some scholars have found that empathy can have a positive impact on consumers' purchase intention, and then promote their consumptions (Gillani et al., 2021; Jing et al., 2022; Yi et al., 2022). Why does empathy affect consumer behavior? This is because empathy and consumer behavioral decision share the same attributes in the psychological context. Empathy can help create a psychological resonance between consumers, which in turn affects consumers' perception of classical furniture products and further change their behavioral decision. In addition, the empathy fusion in the design and promotion of classical furniture advertising can better meets the emotional needs of consumers and helps the brand achieve value enhancement, as well as perpetuates the vitality of classical furniture products and enhances the brand awareness. To implement the consumer-centered concept in the design and promotion of classical furniture advertising, designers need to study deeply how to give the product a richer cultural connotation, in order to trigger consumer empathy and stimulate their purchase behavior.

In existing research, scholars have conducted relatively abundant research on empathy theory, consumer behavioral decision, and factors that influence consumer behavioral decision in advertising design. However, they have not explored these issues in a unified framework for discussion. There are several key issues that need to be addressed: First, is there a correlation between consumer behavioral decision and empathy? Second, how does advertisement influence consumers' behavioral decision? Third, how can empathy be used in the design and promotion of classical furniture advertising to influence consumers' purchasing decision?

In response to above questions, this study employs literature review, theoretical analysis, questionnaire survey and empirical analysis as research methods. This study selects pictures of products of Tanjuyuan, a representative brand in the classical furniture, as the experimental object, and collects data through questionnaire survey with considering the authenticity, validity, and availability of data sources. From theoretical point of view, this study innovatively proposes the possible correlation between consumer behavioral decision and empathy theory, enriches the connotation of empathy theory, broadens the application of empathy theory, and successfully constructs and verifies the dual path model of practical empathy and cultural empathy into consumer purchase decision in the process of classical furniture advertising design promotion. From the practical point of view, the study tested the validity of the empathy scale and the consumer purchase intention scale, pushing the classical furniture advertising design into a new dimension. The study also validates and analyzes the paths through which empathy affects consumers' purchase intentions, providing complete theoretical support and reliable data on how to apply empathy in the design and promotion of classical furniture advertisements. Finally, this study opens a new perspective of classical furniture products from consumers, and it provides a basis for subsequent research on the of empathy communication for other products.

Based on the above three key issues, this study first makes the theoretical analysis to sort out the commonality between empathy and consumer behavioral decision and explores the mechanism of empathy influencing the consumers' purchase intention of classical furniture. Second, this study collects the data of consumers' empathy and purchase intention related to classical furniture advertising through questionnaire survey. Finally, this study applies exploratory factor analysis and validation factor analysis to verify the reliability of the dual path mechanism of empathy affects consumers' purchase intention.

Literature review and hypotheses

Literature review

Empathy and consumer behavioral decisions

There is no universal definition of empathy in academia. Tracing its roots, the concept of empathy emerged from psychology and has been enriched by interdisciplinary research. Throughout the research of scholars, empathy refers to the ability of individuals to perceive or imagine the emotional state of others, understand and experience the emotions of others, then make a certain response (Rivas and Husein, 2022). Instead of being an emotion, empathy is a process of experiencing another person's emotions, emphasizing the ability to resonate with others and having the following three characteristics. First, empathy is objective and fact-based, which has three stages of emotional contagion, perspective taking and empathic concern (Hogan, 1969; Eklund and Meranius, 2021). Second, empathy is heterogeneous. Depending on the target and the situation, there are also significant differences in the strength of empathy generated (Barker et al., 2022). Third, the evolution of empathy could be both positive and negative. Positive empathy is a process of understanding and indirectly sharing others' positive emotional states, while the negative empathy is a process of understanding and indirectly sharing others' negative emotional states. Empathy is a genetically rooted unconscious ability that can be either a cognitive outcome or an emotional state. From the perspective of structure, empathy is multidimensional and generally includes affective empathy and cognitive empathy (Gong et al., 2020; Pedersen, 2021; Weisz et al., 2022). Specifically, affective empathy refers to that individuals can produce alternative responses to others' emotions. It is a bottom-up emotion, which generally follows the Perception-Action model. Cognitive empathy refers to individuals' ability to recognize others' emotions and understand others' views. It is a top-down emotion that involves self-objectification (Ohba and Deen, 2022).

Consumer behavioral decision refers to the process in which consumers are motivated to purchase based on their own needs, form their own cognition, and generate corresponding emotion by perceiving the received product information, engage in purchasing behavior finally (Leung et al., 2022; Sajja, 2022). The process of consumer behavioral decision consists of three aspects: cognitive analysis of products, emotional inspiration, and purchase behavior (Shen and Wang, 2022), with a causal relationship between the first two and the latter one. Among them, consumption cognition is the subconscious memory of products, changes in consumption structure and belief content, whereas consumption emotion is the aesthetic and hedonic feelings experienced by consumers in the process of purchasing (Du and Lin, 2022; Luqman et al., 2017).

Empathy is consistent with consumer behavioral decisions. Empathy and consumer behavior decision making are highly similar in attributes, both belong to psychology; they are also highly compatible in essence, both are a kind of cognition of individuals; and they are structurally identical, both contain cognitive and emotional dimensions. Therefore, it is of practical significance and theoretical value to explore whether empathy theory affects consumers' purchase decisions.

Empathy in the advertising design and promotion of classical furniture

The consumer behavioral decision in the advertising design and promotion of classical furniture refers to a process of consumers selecting, absorbing and processing the received advertising information to form a unique judgment about of classical products, and then generates the consumption cognition and stimulates consumption emotion of classical furniture products, and finally make the purchase decision (Sun et al., 2022). The role of classical furniture advertising design and promotion is to transform consumers' perceptions and influence their behavior (Anghel, 2022). In the literature of advertising, the information that affect consumer behavioral decision are diverse, not only including explicit visual information that displays the appearance, quality and function of products, but also implicit conceptual information that contains cultural elements such as values and social consensus (Cai, 2017; Majer et al., 2022; Martinčić et al., 2022). Furthermore, according to the means of consumers receiving advertisements, the sources of information can be divided into direct reception and indirect reception (Miliano et al., 2018). Direct reception refers to advertising that presents products directly to consumers in a visual form, including linguistic features, display methods and techniques, which directly affects consumers' information processing and leads to consumer emotions about classical furniture, ultimately affects consumers' purchase decision-making (Farshbaf-Geranmayeh et al., 2018). The direct reception is relatively objective, in which the information for consumer behavioral decision is only based on the practical characteristics of the products and personal subjective emotional perception, and consumers will only empathize with the product itself. The indirect reception refers to consumers' sharing of information through other people's re-creation of product advertising content (Lee and Lee, 2016), and forming their own unique opinions through empathizing or value judgment. Therefore, the information source of consumer behavioral decision in the advertising design and promotion is mainly the practicality and cultural value of classical furniture products.

Based on the theory of empathy and consumer behavioral decision, this study believes that empathy in the advertising design and promotion of classical furniture refers to the ability of consumers to resonate with other consumers' attitudes toward classical furniture products both cognitively and emotionally, and to show a desire to buy and share. Since classical furniture has dual attributes of product and culture, and the information source of consumer behavioral decision also has the distinction of explicit visual information and implicit conceptual information, a distinction should be made when analyzing the empathy generated by consumers. Pragmatic empathy based on classical furniture product attributes and explicit visual information, refers to the resonance ability generated by the practical experience of consumers and other consumers in the appearance, quality and safety of classical furniture products. Cultural empathy based on the cultural attributes of classical furniture products and implicit conceptual information, refers to the resonance ability of consumers to resonate with each other in terms of cultural connotations and historical origins of classical furniture products. It is worth emphasizing that the characteristics of pragmatic empathy and cultural empathy have not changed in the process of advertising design and promotion of classical furniture which still retain objectivity, heterogeneity, and differences of evolution trend.

Research gaps

Overall, scholars have conducted relatively detailed research on empathy theory, consumer behavioral decision, and advertisement design and promotion. Studies on empathy have defined the concept, discussed the characteristics, and analyzed the structure. The study of consumer behavioral decision making is more generally based on a psychological perspective. Research on advertising design and promotion has mainly focused on the influence of the context, situation and visual design of the advertisement itself on consumer decision making. However, empathy, advertising design and promotion, and consumer behavioral decision making have not been explored in a unified framework. The following points need to be further explored. Firstly, it is known that consumer behavioral decision-making is highly consistent with empathy in terms of attributes, but the correlation between the two needs a further refinement study. Secondly, there are relatively few studies on consumer behavioral decision in the advertising design and promotion of classical furniture, so detailed research needs to be conducted into this field. Finally, solutions are needed to apply the dual path mechanism of practical empathy and cultural empathy to the design and promotion of classical furniture advertisements, in order to achieve more effective influence on consumers' purchase decisions.

Research hypotheses

Practical empathy and purchase intention

Based on the product attributes of classical furniture, there is a path for practical empathy to affect consumer behavioral decisions. In the advertising design and promotion of classical furniture, the information that affects consumer behavioral decisions is mainly explicit visual information that demonstrates the appearance, quality and function of products (Anderson and Laverie, 2022; Cai, 2022a). Therefore, the research on how the practical empathy affecting purchase intention mainly focuses on four dimensions of product appearance, product quality, product safety and product trust (Chaerudin and Syafarudin, 2021). The appearance of products is the basic factor that affects consumers' preferences, product quality is the main factor that affects consumers' purchase intention, product safety is the potential factor that affects consumers' purchase intention, and product trust is the core factor that affects consumers' repeated purchase (Veselovská, 2022; Chen et al., 2022). Therefore, in the process of practical empathy, consumers use their imagination and cognition to select their own unique viewpoints on products. Due to the emotional influence of other people's attitudes towards product appearance, quality, safety and trust, resulting in positive or negative empathic concerns and finally influencing consumers' purchase intention (Nguyen and Chao, 2021). Therefore, this study proposes the following hypothesis:

> *H1:* Practical empathy has a positive effect on the consumers' purchase intention of classical furniture products.

Cultural empathy and purchase intention

Based on the cultural attributes of classical furniture products, there exists a path for cultural empathy to affect consumer behavioral decisions in the advertising design promotion of classical furniture, the information that affects consumer behavioral decisions comes from implicit conceptual information containing many cultural elements such as classical furniture culture, value and social consensus (Cai and Zhou, 2021; Reyes-Menendez et al., 2022). In the process of empathic communication of classical furniture culture, consumers develop cultural perceptions and emotional states similar to other consumers, through alternative experiences of their cultural emotions of classical furniture (Zhao et al., 2021). Therefore, the research on the path of cultural empathy affecting consumers' purchase intention mainly focuses on cultural elements such as cultural theme, historical origin, craftsmanship and cultural identity of classical furniture products (Swami et al., 2022). Among them, cultural theme is the outermost factor that attracts consumers' attention, historical origin is the potential factor of consumers' understanding, craftsmanship is the key element of consumers' value perception, and cultural identity is the decisive factor of consumers' empathy and purchase behavior (Jamal and Sharifuddin, 2015). In the generation process of empathy on classical furniture culture, consumers are influenced by others' evaluation and experience of multi-dimensional cultural elements of classical furniture products, resulting in cultural emotional contagion, combining with their own imagination and cognition of classical furniture culture to make "perspective-taking," and finally generate sharing or purchasing behaviors based on the results of empathic concerns (Sharifi-Tehrani et al., 2022; Cai, 2022b). Therefore, this study proposes the following hypotheses:

> *H2:* Cultural empathy has a positive effect on the consumers' purchase intention of classical furniture products.

Practical empathy, cultural empathy and purchase intention

Practical empathy is the foundation of cultural empathy, and cultural empathy is the superstructure of practical empathy, and there is both a bottom-up and top-down logical relationship between the above two. Consumers buy classical furniture products to meet their consumption needs, which can be based on a lower level of material need arising from the product itself which is the lowest level of needs or a higher level of the spiritual need arising from the product culture (Palumbo et al., 2021). Only when consumers' practical material needs are satisfied can they seek to satisfy their cultural spiritual needs (Lienert, 2015). The logical sequence of practical empathy followed by cultural empathy provides theoretical support for the emergence of cultural empathy among consumers (Yi et al., 2022). Cultural empathy, influencing practical empathy from top to bottom, reinforces the effect of fusion empathy communication, thereby increasing the purchase intention of consumers (Hyun Park et al., 2017). Practical empathy modifies consumers' perceptions of the practicality of classical furniture products and stimulates positive emotions about the products from the surface; cultural empathy modifies consumers' perceptions of the cultural characteristics of classical furniture products and stimulates positive emotions about the products from the inside, and the two interact to form fusion empathy, which ultimately influences consumers' purchase decisions (Everson et al., 2015). Therefore, this study proposes the following hypotheses:

> *H3:* Practical empathy moderating the effect between cultural empathy and the consumers' purchase intention of classical furniture products.
>
> *H4:* Cultural empathy mediating the relationship between practical empathy affecting and consumers' purchase intention on classical furniture products.

Practical and cultural empathy can independently influence consumers' purchase intentions, while practical empathy acts on cultural empathy to form a fusion of empathy that will ultimately affect consumers' consumption behavior decisions as well. The overall paths of empathy affecting consumers are shown in Figure 1.

Methodology

Research plan

In line with the principles of practical empathy and cultural empathy, this study selected furniture brand Tanjuyuan as the research object and used pictures of its products as the experimental object, as are shown in Figure 2. This study also added to the pictures not only practical information such as product appearance and materials, but also cultural information that can highlight the theme, historical origin, and inherited spirit of furniture products. This study adopted the experimental method of questionnaire survey to verify the hypotheses of empathy paths in the advertising design of classical furniture.

This study constructed an empathy measurement scale for the advertising design promotion of classical furniture, considering the research object, based on the Interpersonal Relationship Indicator Scale (IRI; Ingoglia et al., 2016; Fultz and Bernieri, 2022) and Questionnaire of Cognitive and Affective Empathy (QCAE; Şakir et al., 2021), which are widely used in empathy measurement. To verify the rationality of the empathy scale, the questionnaire data from the pre-study were analyzed for reliability and validity, and the empathy scale was revised and formed for this study. The scale is mainly divided into four parts. The first part is the practical empathy scale, which mainly involves four dimensions of product appearance empathy, product quality empathy, product safety empathy and product trust empathy, with 12 items. The second part is the cultural empathy scale, which mainly includes 12 items of four dimensions related to empathy of cultural theme, cultural origin, craftsmanship and cultural identity. The third part is the integrated empathy scale, which mainly includes three items related to the interaction between practical empathy and cultural empathy. The fourth part is the consumers' purchase intention scale, including two items of two dimensions including first-time purchase and repeated purchase. Likert 5-point scale was adopted in the questionnaire.

Data collection

Affected by the epidemic, the questionnaire survey was carried out online, mainly on social platforms such as Wechat, QQ and Weibo from May to June 2022. A total of 360 questionnaires were collected, 348 of them were screened by validity, with an effective rate of 96.7%. Those questionnaires were randomly divided into two parts, 174 copies each, were used for exploratory factor analysis and confirmatory factor analysis, respectively. The basic characteristic variables are as shown in Table 1, which indicate that the proportion of male and female respondents is relatively balanced. Since the audience of classical furniture products is mainly middle-aged and elderly people, the questionnaire was distributed with certain target, leading to the age of the respondents being concentrated in the range above 40 years old. The respondents' educational background is primarily below college level, and with a monthly income above 6,000 RMB.

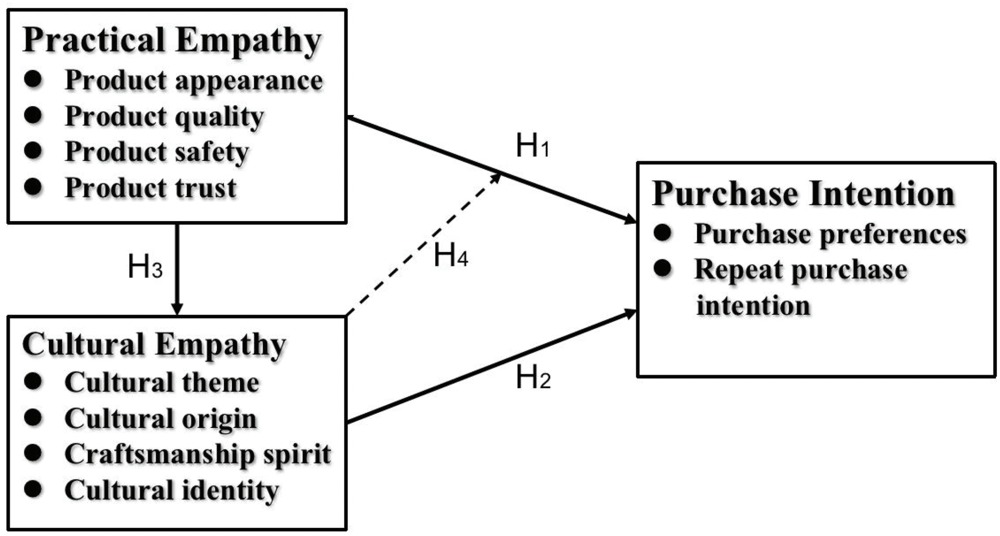

FIGURE 1
Research framework.

FIGURE 2
Classical furniture brand of Tanjuyuan. Those photos were provided by Jiajun Cai.

TABLE 1 Sample basic characteristic variable statistics.

Statistics	Category	Number	Proportion
Gender	Male	164	47.1%
	Female	184	52.9%
Age	Under 18	16	7.5%
	18–29	62	17.8%
	30–39	36	10.3%
	40–49	104	29.9%
	More than 50	120	34.5%
Education	Below High School	140	40.2%
Background	Specialized subject	110	31.6%
	Undergraduate course	68	19.5%
	Above Postgraduate	30	8.7%
Income (RMB)	Under 3,000	88	25.3%
	3,000–6,000	54	15.5%
	6,000–9,000	120	34.5%
	More than 9,000	86	24.7%

Validity of measurements and model fit testing

This study adopted SPSS24.0 and AMOS24.0 software to analyze the data for the explore and validate the empathy paths in the advertising design and promotion of classical furniture. SPSS24.0 software was used to conduct exploratory factor analysis to verify the reliability of the empathy scale and modify the empathy model. AMOS24.0 was used to conduct goodness-of-fit tests and structural equation analysis of the modified empathy model (e.g., Luqman and Zhang, 2022).

In this study, KMO test value and Bartlett spherical test were performed on the 174 valid samples. KMO value is 0.957, Bartlett spherical test value is 2,574.054, and the significance is <0.001; The reliability analysis is also made, and Cronbach's α value is 0.963. Overall, the reliability and validity of the scale are excellent, which meets the standard of exploratory factor analysis (Luqman et al., 2021; Shaikh et al., 2022; Zhang et al., 2022).

In this study, the covariance matrix is constructed, the factors are extracted by principal component analysis, and rotated by the maximum variance method. After six rotations, the convergence is achieved. The indicators demonstrate a clear four-factor structure, and the total variance interpretation rate is 80.2%. The items were screened according to the principle of item analysis, the final component matrix is as shown in Table 2: factor 1 is practical empathy, which mainly includes seven indicators from a1 to a7; factor 2 is cultural empathy, which mainly includes six indicators from b1 to b6; factor 3 is blend empathy, which mainly includes one indicator of f2; factor 4 is purchase intention, including two indicators of f1 and f3.

Mediation model fit testing

Based on exploratory factor analysis, AMOS24.0 was used to conduct confirmatory factor analysis (CFA) on the remaining 174

TABLE 2 The rotated component matrix

Outcome measurement	Practical empathy	Cultural empathy	Empathy fusion	Purchase intention
a1 Emotional contagion of product appearance	0.666			
a2 Product quality point of empathic concern	0.524			
a3 Product quality point of view selection	0.785			
a4 Selection of product appearance	0.605			
a5 Emotional contagion of product safety	0.506			
a6 Product safety perspective selection	0.532			
a7 Empathic concerns about product trust	0.591			
b1 Selection of views on cultural themes		0.721		
b2 Cultural themes empathic concerns		0.562		
b3 Cultural origin perspective selection		0.699		
b4 Cultural origin empathic concerns		0.673		
b5 Craftsmanship empathy		0.670		
b6 Empathic concerns about cultural identity		0.592		
f1 Purchase preference				0.585
f2 Empathic interaction			0.716	
f3 Repeated purchase intention				0.629

valid questionnaires, and the mediation effect of the model was verified by Bootstrap test. The overall fitting results of the model are as shown in Table 3: CMIN/DF is 1.132 (<2), which reveals a good test value; indicators such as GFI, AGFI, CFI, RFI, IFI, NFI and NNFI are all >0.9, suggesting excellent goodness-of-fit; ECVI value is small, RMR is 0.027 (close to 0), which can be seen all indicators show excellent goodness-of-fit. Therefore, the CFA suggests that the empathy path model and factors have excellent goodness-of-fit, and all parameters are valid (Hox and Bechger, 1998).

TABLE 3 Mediation model fit.

Statistical detection quantity	Parameter values
CMIN/DF	1.132
GFI	0.929
AGFI	0.902
CFI	0.990
RFI	0.907
IFI	0.990
NFI	0.924
NNFI(TLI)	0.988
ECVI	1.122
RMR	0.027

Results

Hypothesis test results

Verifying the above hypotheses, it can be obtained that the coefficient of H1 is 0.23, the coefficient of H2 is 0.10, the coefficient of H3 is 0.90, and the coefficient of H4 is 0.63. Therefore, the four hypotheses in this study are supported, and the effect is positive. The detailed information was shown in Table 4.

TABLE 4 Model hypothesis results.

Research hypothesis	SEM	Path coefficient	Test results
H1: PE has an effect on PI	PE → IE → PI	0.23	Supported
H2: CE has an effect on PI	CE → PI	0.10	Supported
H3: PE has an effect on CE	PE → CE	0.90	Supported
H4: CE has an effect on PE to PI	CE → IE → PI	0.63	Supported

PE, Practical Empathy; CE, Cultural Empathy; IE, Integrated Empathy; PI, Purchase Intention.

From Table 4, it can be concluded that the coefficients of emotional contagion of product appearance (a1), product quality point of view selection (a3), emotional contagion of product safety (a5), and product safety perspective selection (a6) range from 0.7 to 0.8; product quality point of empathic concern (a2), selection of product appearance (a4), and empathic concern about product trust (a7) range from 0.6 to 0.7, showing a high significance; In the items of cultural empathy and practical empathy, cultural theme empathic concerns (b2), cultural origin perspective selection (b3), cultural origin empathic concern (b4), craftsmanship empathic concern (b5) and empathic concern about cultural identity (b6) are >0.7, except the coefficients of selection of views on cultural themes (b1) which is between 0.6 and 0.7, showing a high significance; In terms of empathy fusion, the empathic interaction (f2) coefficient is 0.74, which is highly significant; in terms of purchase intention, the coefficient of purchase preference (f1) and repeated purchase intention (f3) are both 0.72, with a higher significant level. Overall, each factor loading shows a valid level, which can effectively reflect the correlation between practical empathy, cultural empathy, empathy fusion and purchase intention. These factors constitute a practical-cultural dual empathy model as shown in Figure 3.

Research conclusions

According to the above research, the factors affecting consumers' purchase intention mainly include practical empathy, cultural empathy, and empathy fusion. Among them, cultural empathy plays a leading role in affecting the consumers' purchase intention. Besides, empathy fusion is the pivotal mediator for cultural empathy to realize its role in the effect of practical empathy on consumers' purchase intention. Compared with the direct effect of practical empathy, the indirect influence of cultural empathy and empathy fusion on consumers' purchase intention is more significant. Therefore, in the design and promotion of classical furniture advertising, the paths through which practical and cultural empathy affect consumers' purchase intentions are divided into four stages: first, cultural empathy directly affects consumers' purchase intentions; second, cultural empathy indirectly affects consumers' purchase intentions by influencing empathy fusion; third, practical empathy affects consumers' purchase intentions by influencing empathy fusion; fourth, practical empathy affects consumers' purchase intentions by influencing cultural empathy and then empathy fusion.

Discussions

Theoretical implications

First, this study verifies that consumer behavioral decision can effectively interconnect with empathy theory. Factors such as empathy, advertising design and promotion, and consumer behavioral decision have been explored within a unified framework, and a dual path model of practical and cultural empathy influencing consumer decision in the process of classical furniture advertising design and promotion is constructed. Furthermore, based on the theory of consumer behavioral decision, this study introduces the explicit visual elements related to the four dimensions such as product appearance, product quality, product safety and product trust in the advertising design of classical furniture into the practical empathy scale. Finally, factor analysis verifies the connotation and the rationality of the practical empathy scale.

Second, this study enriches the connotation of empathy theory and broadens its application in the advertising design and promotion of classical furniture. Based on the dual attributes of product and culture of classical furniture, this study redefined the theory of empathy from the perspective of both practical empathy and cultural empathy. Moreover, practical empathy and cultural empathy are introduced into the process of advertising design promotion of classical furniture, which enriches the research of

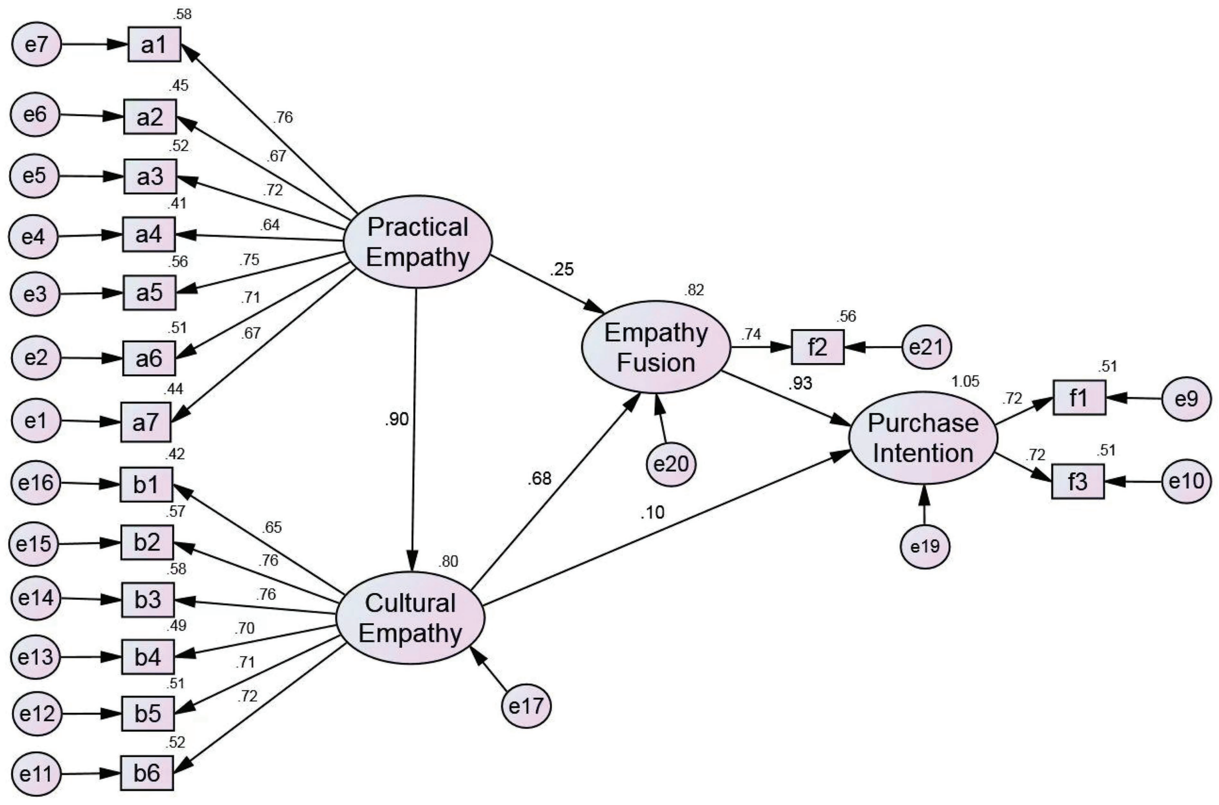

FIGURE 3
Structure model.

contributing factors of consumer behavioral decision on classical furniture products.

Third, this study constructs and verifies a dual-path model for how to utilize practical empathy and cultural empathy to affect consumers' purchase decision in advertising design and promotion of classical furniture. In the process of influencing consumer behavioral decision, practical empathy and cultural empathy enhance consumers' purchase intention of classical furniture products. In addition, empathic fusion plays a pivotal mediating role in the process of practical empathy affecting consumers' purchase intention, which is the core of positively influencing the purchase intention of classical furniture consumers.

Practical implications

First, it is necessary to improve the quality of classical furniture products and optimize advertising design and promotion to enhance consumers' practical perceptions. According to the results of structural equation model analysis, it is clear that practical empathy is the starting point in all four paths of consumer purchase intention, which shows that practical empathy is the basis for the influence of empathy theory to influence consumer behavior decisions. In fact, the effect of practical empathy on consumers' purchase intention is not significant, but indirectly affects consumers' behavioral decisions through cultural empathy and empathy fusion. Therefore, the quality of classical furniture products, as the most basic element, should play its role well and update classical furniture products and advertising design according to consumers' needs and aesthetics in a timely manner, so as to provide consumers with a good consumption experience. Additionally, due to the obvious product attribute and characteristics of classical furniture, the advertising design and promotion should also focus on product appearance, quality and safety. These aspects provide guarantees for consumers' practical perception and improve their purchase intention.

Second, it is necessary to enrich the cultural connotation of classical furniture to ensure consumers' good cultural value perception. According to the results of structural equation model analysis, cultural empathy not only directly affects consumers' purchase intention, but also indirectly affects consumers' purchase intention through the role of empathy fusion. The effect of cultural empathy is related to the effect of cultural cognition and emotional cognition of classical furniture consumers, so classical furniture manufacturers and advertising producers, as the creators of classical furniture product culture, should take more efforts to improve the quality of product cultural content. The focus of cultural themes and the depth of product origin in advertising design of classical furniture are the basic cultural content requirements to enhance the consumers' purchase intention. Besides, the craftsmanship contained in the production technology is utilized to achieve the consumers' recognition of the cultural value of classical furniture products and realize consumers' deep and immersive cultural empathy. The consumers' cultural consumption needs should be well satisfied by ensuring their perception of the cultural value of classical furniture and creating a brand of classical furniture with cultural connotation.

Third, it is necessary to build the interconnection between consumers' practical and cultural empathy to enhance consumers' purchase intention. According to the results of structural equation model analysis, empathy fusion is one of the important factors that affect consumers' purchase intention. In the process of consumption, consumers not only meet their needs of products, but also meet their pursuit of cultural spirit and emotional experience. Therefore, in the advertising design of classical furniture products, we should actively integrate practical empathy into cultural empathy to strengthen the interaction of consumers' cognition and emotional experience of classical furniture products and culture to further enhance consumers' purchase intention.

Conclusion

This study innovatively adopts the dual perspectives of practicality and culture to construct the mechanism of empathy effect on consumers' purchase intention in the design and promotion of classical furniture advertisements. In the meanwhile, it verifies the reliability through an empirical analysis of the structural equation model. It also reveals that there are four main paths for practical empathy and cultural empathy to affect consumers' purchase intention, among which the empathy fusion formed by the interaction of practical empathy and cultural empathy is the pivot in the mechanism. However, this study also has some limitations, which need to be further improved in the follow-up studies. First, the questionnaires were only distributed to targeted customers of classical furniture products within a specific age range, there may be some risks in the representativeness of the data. Second, factors that affect consumers' purchase decision are relatively diverse. This study explored only those from the perspective of consumers' psychology, so the conclusions may not be comprehensive enough. Third, the channels and methods of advertising design and promotion of classical furniture products may also affect consumers' purchase intention, which can be explored further in subsequent research.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

JC contributed to the design of the framework, the collection of primary materials, the framework development, and the revision of the total work. LY contributed to the empirical work, the analysis of the results, and the writing of the first draft. Both authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Consumers' willingness to pay premium under the influence of consumer community culture: From the perspective of the content creator

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With the rise of live streaming commerce, the relationship between consumers and content creators on the short-video platforms has become closer, forming a peculiar culture and language in each consumer community, which promotes the short-video platforms to become a natural breeding ground for forming consumer communities. While such communities give birth to its own language and culture from the interaction between content creators and consumers, this kind of co-creation can not only enhance the consumers' trust to improve commodity premium space, but also strengthen the ties within the community and spread the information outside the communities, and consequently, expand community scale. Based on the view of the value co-creation from the language and culture among content creators and consumers in the communities, this study starts from the point of product type, employs consumers' Willingness to pay premium (WoPP) as a proxy variable of brand advocacy in the co-creation of cultural and language values in consumer communities, and conducts three single-factor experiments between two groups. By analyzing the experimental results, this study identified the influence under the potential relationship mechanism, social comparison, and found another variable that can moderate the relationship, consumer trust, portrays the relationship between the product types of the live streaming commerce and the consumers' WoPP, and explores the mediating effect of social comparison and the moderate effect of consumer trust effect. This paper also analyzes and discusses the WoPP caused by the co-creation of cultural and language values co-created by creators and consumer communities.

KEYWORDS

consumer community, language and culture, value co-creation, WoPP, social comparison, consumer trust

Introduction

With the rapid rise of short-video platforms such as TikTok and Kuaishou, the overall social media environment has changed dramatically. Specifically, the short video as the main content of cultural creative virtual brand community has become an increasingly important source of cultural output. These short videos with different styles and themes meet the needs of users of different ages and social strata, conform to the consumption habits and requirements of modern society (Zhang, 2021), and provided the necessary conditions for the birth of consumer communities (Muniz and O'Guinn, 2001). Among three archetypes of community forms: business–consumer (BC), consumer–consumer (CC), and a combination of the two (BCCC), BCCC should be the ideal form (Storvang et al., 2020). Because of the rapid interaction may occur not only between content creators and consumers, but also among consumers, the consumer communities on content creation platforms should be categorized as the third form. Community is exactly one of the four dimensions that affects consumer behaviors (Mathras et al., 2016), and consumer communities on content creation platforms affect consumers in a special way. In such communities, the unique community culture and community language will be born in the interaction between content creators and consumers, and the unique language and culture co-created by such consumers and creators tend to enhance the trust of consumers in most of the time (Zhu et al., 2022), and promote consumption to feed creators back. The main consumption mode is live streaming commerce. It is captivating that the creation of short video content and the corresponding consumption mode of live streaming commerce need the continuous supply of high-quality content and marketing strategies, which makes the relationship between users and content creators closer. Thanks for the closer relationship, the consumer community becomes more active, and the frequency of community language and culture output is also increased. At the same time, the community will also expand in size due to the external communication of its language and culture (Weil, 1996). Values based on common language and culture are the foundation of community (Gardner, 1994). In this virtuous cycle, the value generated by the unique culture of the community created between content creators and consumers will not only be reflected in the improvement of the potential value of commodities, but also play a certain role in regulating consumers' continued consumption in the creators' community (Zhu et al., 2022). In other words, today's short-video platforms are reshaping the traditional social media value co-creation process and giving value co-creation a whole new perspective and novel way of operating.

Nevertheless, research on the relationship between social media content creators and consumer value creation has not received extensive attention due to the relatively short rise of the market (Singaraju et al., 2016; Dolan et al., 2019). Furthermore, given that short-video platforms such as TikTok and Kuaishou have broken through traditional social media consumption patterns (e.g., expanding from influencer endorsements to live streaming commerce), emerging issues such as the interaction and connection between consumers and live streamers originally as content creators, how consumers understand the meaning and value of live streaming, and how content creators now as commodity agents balance economic benefits and customer relations have not yet been widely discussed in the academic community (Lu et al., 2021). Especially for value co-creation in social media, almost all traditional value co-creation studies seriously prefer to view value creation through non-interactive value formation methods when evaluating the concept of value creation (e.g., Bagozzi, 1975; Hunt, 1976). From this perspective, value is regarded as generated by separating the value systems of the company and the customer. And the value creation process is viewed as a firm-dependent phenomenon, as advocated by the Resource-based View (Barney, 1991). However, related research on marketing recognizes the importance of value creation from the perspective of interactive value formation (Prahalad and Ramaswamy, 2000; Vargo and Lusch, 2004). In contrast to embedding conceptualized value into products or services, "In this point of view, suppliers and customers jointly create services and shape products in cooperation. Moreover, it also means that value is not increased in separate and non-interactive production and consumption processes, but jointly created, realized, and evaluated in the social context of production and consumption processes." (Echeverri and Skalen, 2011).

Based on such a perspective of value co-creation, systematically analysis of the social media content creators' interaction with consumers, two-way influence, and community construction in commercial promotion activities is particularly important. From the perspective of TikTok content creators, this study will make an in-depth analysis of consumers' coping strategies caused by differences in value co-creation elements when recommending different types of products. According to Yi and Gong's (2013) theoretical measurement and analysis framework for customer value co-creation, this study takes consumers' Willingness to pay premium (WoPP) for different live stream-recommended commodities (hedonic products and practical products)—whether they are willing to pay extra prices for recommended commodities—as a proxy variable for brand advocacy in consumer value co-creation behavior (Ranjan and Read, 2016) and explores the potential link through a series of online experimental studies.

Literature review and research hypothesis

Peculiar language and culture of each consumer community

Due to social demands and stress resistance, people will be continually distracted by social media (Koessmeier and Buttner, 2021). This phenomenon makes short-video platforms a natural breeding ground of consumer communities. According to the definition of brand community, "professional and non-geographically restricted community, based on the structured social relationship among the admirers of a brand" (Muniz and O'Guinn, 2001), the object of admiration of consumer community is not limited to a certain brand but can be all creators. The behaviors, systems, and norms generated in the community, and even extended to the knowledge, belief, art, law, custom, ability, and habit in the community, are collectively referred as the culture of the community (Tylor, 1871). At the same time, based on the common linguistic context, some communities' unique languages emerged. On the one hand, such culture and language co-created by creators and consumers can have a positive impact on customer perceived value, which mediates the relationship between co-creation behavior and consumers' continuous use intention (Zhu et al., 2022). In addition, the unique culture and language of the consumer community can stimulate the empathy of consumers in the community, which has a positive impact on consumers' tolerance for services and their intention to purchase again (Wei et al., 2022). On the other hand, it can increase consumers' trust in creators, thereby increasing their sense of trust in the products promoted and carried by creators (Zhao et al., 2021), and then feeding creators back. Rubio et al. (2016) once concluded on online consumption that because online shopping promotes competition, increases the comparison of homogeneous products, and reduces the cost for consumers to change decisions, consumers' loyalty and trust in products are essential for online suppliers (Rubio et al., 2016). The main sources of consumer loyalty and trust include spokesperson, word of mouth, business leader, and business culture (Zhao et al., 2021). The language and culture of the consumer community is a great source of loyalty and trust for consumers.

On the other hand, the community will also expand due to the external communication of its language and culture (Weil, 1996). For example, recently many internet slangs from the short-video platforms are derived from some interesting, impressive punchline of content creators, and the content creators may use those slangs as their memory points or synonym. In this process, consumer communities will form their peculiar language and culture, and promote the expansion of communities according to such language and culture. Values based on a common language and culture are the foundation of community. Like what Gardner said, "no society can survive without a reasonable basis for shared values" (Gardner, 1994). Under this environment and background, the consumer community phenomenon is flourishing, and with the support of its unique language and culture co-created with the creators, it develops rapidly, laying the foundation for live streaming commerce.

If we observe the phenomenon of consumer community from the perspective of social practice theory, content creators, as an indispensable link in material, contribute to the participation and practice of platform users. In the traditional sense, consumer diffusion usually explores the flow of various phenomena (such as ideas, services, and information) by measuring the frequency of adoption, the mode of adoption, and/or the potential penetration level of adoption. Such studies of diffusion are usually conducted by tracking changes in sales in a particular market segment (Gatignon and Robertson, 1985). The penetration and diffusion of language and culture in a consumer community is exactly in line with this idea. Practice as a community-constructed concept can likewise diffuse or be diffused. Specifically, according to Akaka et al., 2022, practice theory includes the way social practices, working as links of understanding, action, and speech (Schatzki, 1996), are reproduced, stabilized, adapted, and embedded in a collection of fragmentary ideas (Reckwitz, 2002; Warde, 2005; Shove et al., 2012). It is important to explore how practices migrate (Maller and Strengers, 2013) and change (Shove, 2005) since such research helps to link up the previous consumer research on diffusion and practice. They provide an in-depth look and insight into the process of practice diffusion. For example, studies of the evolution of practice have explored questions such as how practices have changed over time, which further reveal the technical, social, and cultural factors that influence the integration and possession of routines, rituals, and cultures (Hand and Shove, 2004; Hand et al., 2005). Changes in practice can be studied within a particular social structure (e.g., family, group, and nation) or as they "cross" socio-cultural boundaries (e.g., transnational). Practice migration is a special way of practice dissemination and change (Maller and Strengers, 2013). In both cases, a practice can be adapted through shifts in broader socio-technical structures that include social, cultural, and material variety of products that shape everyday life (Hand et al., 2005). In this study, the unique culture and language created by the consumer community serves as the carrier of practice, which makes the practice spread within the community and migrate between communities, affirming the value created by the creator and the consumer community, and indirectly proving the premium space created by them.

Experiential consumption and material consumption

In real life, products purchased by consumers can often be divided into different categories, among which experiential products and material products are typical classification methods (Gilovich and Gallo, 2020). Experiential products are those purchased primarily for the purpose of gaining life experience. On the contrary, material products refer to those products purchased for the main purpose of obtaining material wealth (Yang et al., 2020). Previous studies have found that compared with purchasing material products, purchasing experiential products can often bring consumers stronger happiness (Bastos and Brucks, 2017). Van Boven and Gilovich (2003) asked the subjects to recall the material products or experiential products purchased of more than $100 recently, and then asked them to indicate their perceived happiness from the purchased products. The final results showed that the subjects who recalled their purchase of experiential products perceived stronger happiness. Moreover, consumers tend to hold more negative evaluations of individuals who prefer to buy material products (vs. experientially purchased products) (Carter and Gilovich, 2010, 2012).

Based on the research, subsequent studies have explored the mechanisms behind experiential products (vs. material) making consumers happier. On the one hand, compared with experience, satisfaction and happiness brought by material consumers tend to fade away more easily. Although classical psychological studies have long found that individuals tend to show strong adaptive ability in both positive and negative experiences, their emotional reactions after corresponding events will gradually calm down (Kalokerinos et al., 2017). Nevertheless, relevant studies still show that compared with material purchase, the happiness and satisfaction brought by experiential products disappear more slowly (Nicolao et al., 2009). For example, in one study, people were asked to recall material or experiential purchases they had made for at least $50. When participants were asked how satisfied they felt at the time of purchase, there was no difference across conditions. Those who recalled material purchases enjoyed it as much as those who recalled experiential purchases. But when they are asked how satisfied they are with their purchases now, there is a clear difference: satisfaction with material purchases has decreased from then, but not with experiential purchases (in fact, satisfaction has increased) (Carter and Gilovich, 2010).

Another reason why experiential consumption is more likely to bring consumers stronger happiness is the consideration of interpersonal relationship. Compared with material consumption, experiential consumption can more closely connect consumers with others (Weingarten and Goodman, 2020), and then have a positive impact on the consumer community, which is conducive to the output of community language and culture. Previous research has shown that people who share similar experiences tend to have stronger bonds than people who buy the same products. It is obvious that consumers do not want others to buy the same products in terms of material purchases because consumers have strong unique demands for material products (Carter and Gilovich, 2010).

Finally, previous studies have compared experiential consumption and material consumption from the perspective of social comparison. Experience is less easy to compare than material products—it is more difficult to compare one by one to determine which one is superior, so it may be less affected by social comparison than material products (Boven, 2005). Similarly, Howell and Hill (2009) found in a study that experiential spending is related to the improvement of happiness partly because experiential consumption reduces social comparison.

TikTok platform and consumer's willingness to pay premium for material products

Although there is no research that directly explores and proves the influence of content creation platforms such as TikTok on consumers' preference for different types of products, some studies provide a very important theoretical basis for the hypothesis of this research.

On the one hand, the use of media is closely related to materialism (Ferguson and Kasser, 2013). Some studies found that TV advertising was closely related to materialism (Shrum et al., 2011). Even after controlling for age, gender, and socioeconomic status, the relationship between television advertising and materialism remains significant (Buijzen and Valkenburg, 2003). Related research find (Shrum et al., 2005) that the world presented by television is quite different from the reality. For example, the level of wealth and achievement shown on television is greater. This may give viewers a distorted belief that wealth is quite common, which, in turn, may drive consumers to seek material wealth. On the other hand, the use of social media may increase consumers' impulse buying behavior. Some studies have explored the psychological mechanisms behind this phenomenon. Social media intensity can lead to decreased self-control in individuals. Three potential sources of this failure include (1) emotional distress caused by goal conflict; (2) lack of self-awareness due to inability to monitor oneself; and (3) exhaustion of self-control ability due to the exertion of previous self-control (Baumeister, 2002). First, social media provides a deluge of information that can create conflicting standards about expected behavior. When people are not clear about which goals/standards/norms to pursue, they tend to adopt choices that make them feel good to reduce their pain. Therefore, the overuse of social media reduces consumers' self-control. Second, browsing social networks enables people to follow the status and stories of other. As a result, it reduces their self-awareness. Declining self-awareness often leads consumers to have less control over themselves. Finally, self-control is similar to energy, which can be temporarily depleted and restored (Baumeister, 2002). Therefore, excessive participation in social media consumes self-control. On this basis, subsequent studies did find that social media use increased consumer impulse spending. Khan and Dhar (2006) found that consumers tend to display their luxury goods on social networking sites to boost their self-esteem. Similarly, when consumers want to achieve higher self-esteem, they will also show more indulgent behaviors (Wilcox et al., 2011).

Based on the existing studies above, this study believes that content creation platforms such as TikTok essentially meet the characteristics of traditional media and social platforms. Hence, consumers should have a significant preference on material products, and should willing to pay more premium for material product on those platforms compared with experiential products. More specifically, the recommendation of material products vs. experiential products in live streaming commerce on content creation platforms should significantly increase consumers' WoPP. In conclusion, this study puts forward the first hypothesis:

> *H1*: Compared with the experiential products, the material products recommended by the content creation platform have significantly increased consumers' WoPP.

The mediating effect of social comparison

According to Social Comparison theory (Festinger, 1954), individuals obtain evaluation information by comparing their own opinions and abilities with those of others. Social comparison tends to drive individuals to be better than others. Bogaerts and Pandelaere (2013) use social comparison to explain the internal mechanism of how individuals obtain group location information through social comparison. Lampi and Nordblom (2010) demonstrated that people are more concerned about their relative status if they are aware that their parents are constantly comparing them to others. The use of content creation platforms such as TikTok will increase consumers' social comparison tendency. Nowadays, platforms such as TikTok have become a stage for beautiful people to show themselves, as well as a platform for individuals to "show off their wealth. Although the contents displayed are often embellished for the consideration of image management, these platforms are full of information indicating that others (and viewers) are doing better and living better (Chou and Edge, 2012). Such information can easily lead individuals to make upward social comparison. Researchers have demonstrated that the use of relevant platforms, especially passive use, significantly elicits upward social comparison (Vogel et al., 2014; Liu et al., 2017) and feelings of jealousy (Tandoc et al., 2015; Verduyn et al., 2015).

While classical psychological research considers social comparison to be informational reference, recent research has also found that social comparison profoundly influences individual product preference. For example, when the social comparison is high, consumers will prefer the products with design styles that can attract people's attention (Rucker and Galinsky, 2009). In addition, previous studies have shown that there is an outstanding positive correlation between social comparison and materialism tendency. The stronger the social comparison tendency, the higher the materialism tendency of consumers. According to the social comparison theory, comparing with others who are better off will lead to unfavorable self-evaluation (Liu et al., 2017). In order to improve their impaired self-concept, individuals may try to have more material possessions to eliminate their insecurities. Researchers have found that individuals who make social comparison with media celebrities consider acquiring more property as their top priority (Chan, 2008).

From the perspective of social comparison, it is necessary to ensure that the products used have strong social comparison attributes. Experiential products emphasize pleasure and enjoyment; as a result, the comparability between products is poor. Material products emphasize functional and instrumental needs. Therefore, it is easy for individuals to find relatively better products, and it is easier to compare with others. Hence, the social comparison tendency increases the consumer's preference for material products without affecting the consumer's preference for experiential products. To sum up, this study puts forward another hypothesis:

> *H2*: The relationship between the recommendation of material products in the content creation platforms and consumers' WoPP is mediated by social comparison tendency.

The moderating effect of consumer trust on willingness to pay premium

Previous marketing research literature constantly emphasizes the importance of mutual relations in business activities and business contacts in repeated and developed experiments, and advocates the need to establish a mutually beneficial and friendly relationship with customers (Gremler and Gwinner, 2020).

In fact, such a beneficial and mutually beneficial relationship can greatly enhance the sustainable transaction between the customer and the merchant, and ultimately achieve brand/company loyalty and review. Mutually beneficial relationships are largely based on consumer trust in the brand/company. Trust is a complex structure involving relationships among individuals, groups, and organizations (Fulmer and Dirks, 2018). In the process of conceptualizing trust, researchers from different fields have adopted different research perspectives. The differences between conceptualizations will cause confusion, misunderstanding, and communication barriers in the research of consumer trust (McKnight and Chervany, 2001). Nonetheless, sociological and organizational behavior research has focused the understanding of trust on a dynamic, reflexive process (Audrey Korsgaard et al., 2018; van der Werff et al., 2019). In this point of view, as demonstrated by the interactive relationship in the consumption process, trust is defined in this study as the confidence and positive expectation that the service provider (whether the company, the brand or the entrusted party represented by it) will fulfill the exchange agreement (Grayson and Johnson, 2015).

In the field of consumer behavior research, consumer trust has received extensive attention from scholars (Chaudhuri and Holbrook, 2001; Erdem and Swait, 2004). Based on different theoretical perspectives, different scholars have made in-depth discussions on the role of consumer trust in consumer decision-making, judgment, and behavioral tendency. Especially in recent years, the study of consumer trust along with the popularity of false information on the Internet and frequent brand crisis has gradually become an important research topic. For example, Kwon and Barone (2020) found through a series of experimental studies that exposure to fake news makes consumers with liberal tendencies more distrustful of information sources. At the same time, this distrust weakens their level of trust in the company providing the product/service, which lowers their evaluation of that product/service. Rajavi et al. (2019) investigated whether consumer trust in brands is influenced by the marketing mix activities (i.e., advertising, new product introductions, distribution, prices, and price promotions) implemented by brands using data from 46 product categories in 13 countries worldwide. They found that the intensity of advertising and new product launch had a strong positive impact on consumers' brand trust, while the intensity of price and distribution also had a certain positive impact on consumers' trust. However, the intensity of price promotion has a negative impact on consumer trust. In addition, the authors found that the impact of marketing mix activities on consumer trust is moderated by consumer personality traits, consumer dependence on a category brand, and national secular rationality and self-expressed cultural values. Trust not only affects consumers' evaluation of businesses, but also affects the mutual trust between consumers. According to this inference, Engeler and Barasz (2021) found through myriad laboratory experiments and field experiments that brand collocation would affect consumers' trust in another consumer's recommendation. Specifically, consumers tend to lack trust in suggestions from other consumers using a single brand combination, and this distrust is determined by inferences about the way consumers choose products. With the iteration and change of the consumer scene, the consumer trust in e-commerce has gradually attracted the attention of the marketing community. Just as in traditional offline scenarios, higher consumer trust can also bring certain benefits to online sellers. The complexity and speed of online purchasing decisions make consumer trust an important determinant of the success of a business model (McKnight and Chervany, 2001; Paliszkiewicz and Koohang, 2013).

To sum up, this study believes that consumer trust has a moderating effect on the relationship between different types of products recommended by TikTok live streaming and consumers' WoPP. Specifically, consumers' WoPP for experiential products will decrease with the decline of consumer trust, but this moderating effect does not exist for material products.

> *H3*: consumer trust produces a positive moderating effect on the relationship between product types and consumers' WoPP, but this moderating effect does not exist in the material products.

Based on the above Hypothesis, the research model of this paper is shown in Figure 1.

Research design

Experimental study one: Effect of material and experiential products on WoPP

The primary goal of Study 1 is to provide preliminary evidence for hypothesis 1 by experimental manipulation. The types of recommended products seen by the subjects were manipulated by experiment, and the WoPP was measured. A total of 211 Chinese adults, including 143 females, with an average age of 30.29 (SD =6.939), were recruited through the Chinese questionnaire collection platform (Questionnaire Star). The data sample service provided by this platform has been verified and supported by many studies, and its samples are representative to a certain extent, which can meet the sample characteristics and structure required by the research questions proposed in this study. Related studies on consumer behavior have also proved that the samples of the Questionnaire Star platform have certain advantages in terms of data reliability and validity (Guan et al., 2020).

Study 1 used a single-factor and two-level experiment process (TikTok content creators recommended product type: experiential vs. material), which experimentally manipulated the types of products the subjects saw and measured their WoPP for different types of products. In the study of operability, this study draws on the method of studying the behavior of the same type of consumer behavior, and uses the picture to present product information (To and Patrick, 2021; van der Lans et al., 2021). The subjects were randomly shown a screenshot of a TikTok content creator recommending a product. One typical material product and one

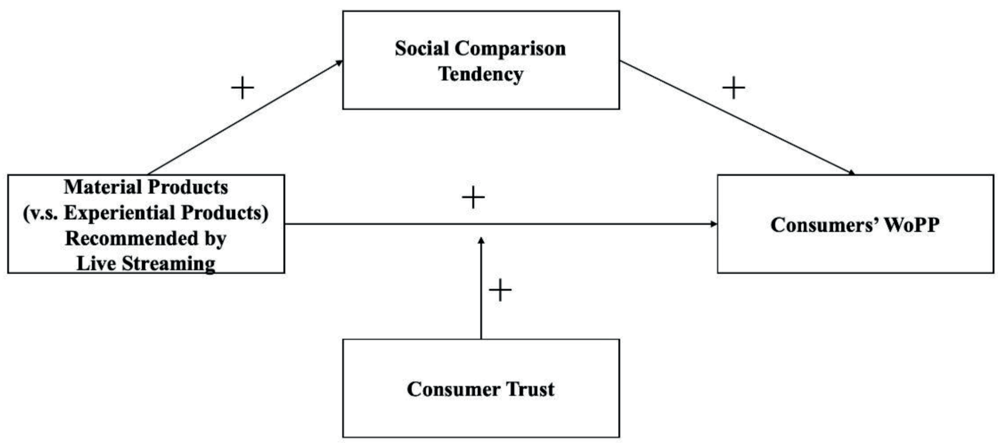

FIGURE 1
Theoretical model of research.

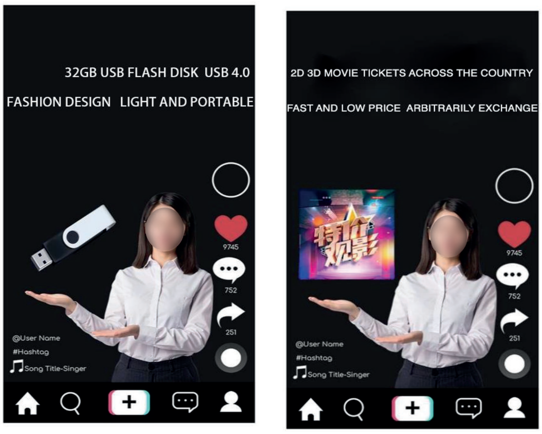

FIGURE 2
Study 1: Experimental materials.

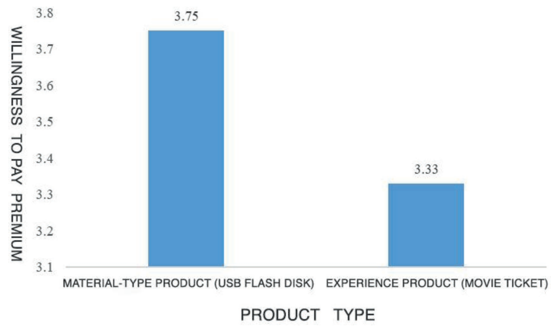

FIGURE 3
Result of study 1.

typical experiential product were selected in this experiment. The subjects in the experiential product group saw an advertisement recommending movie tickets, while the subjects in the material product group saw a USB flash drive. The advertisement is shown in Figure 2. After viewing the corresponding product recommendations, the subjects were asked to indicate how much they agreed with the following statements: (1) Pay more for the product; (2) I can pay extra for this product; (3) It's acceptable to pay more for this product; and (4) I am willing to pay more for this product ($\alpha = 0.939$). Finally, after completing the purchase intention-related items, the subjects were required to complete the measurement of the manipulation test ("To what level do you think the product you just saw in the TikTok live streaming recommendation fits the following description?" 1, experiential product; 7, material products) and report their demographic information (income, gender, age, etc.).

The subjects believed that the recommended products presented by the material product group had higher material attributes compared with the experiential products, while the experiential products had higher experience attributes. The difference was significant (M substance product = 1.59, SD = 0.62 vs. M experiential product = 5.88, SD = 0.58, $F(1,201) = 3.668$, $p = 0.000$). The manipulation of product types in this experiment is successful. The analysis of variance (ANOVA) result depicts that on the TikTok platform, in material products group, compared with experiential products, the subjects had higher WoPP ($M_{\text{material products}} = 3.75$, SD = 1.50 vs. $M_{\text{experiential products}} = 3.33$, SD = 1.58, $F(1,201) = 2.376$, $p = 0.023$). Therefore, hypothesis 1 is verified. Compared with experiential products, TikTok's recommendation of material products increases consumers' WoPP. The specific experimental results are shown in Figure 3. There were no significant differences in gender, age, and income between the two product types ($p > 0.05$).

In conclusion, through the experiment, Study 1 manipulates the types of recommended products subjects saw. The result portrayed that the WoPP of consumers on content creation platform is significant, and between consumers' WOPP on USB flash drives and movie tickets, the WoPP of consumers exposed to the latter is significantly lower than the WoPP of consumers exposed to the former. Hypothesis 1 is verified: when recommending material products by content creators *via* content creation platforms, consumers' WoPP is higher compared with recommending experiential products.

Experimental study two: Mediating effect of social comparison

The above research verifies hypothesis 1: compared with recommendation of experiential products, content creators' recommendation of material products on content creation platforms can increase consumers' WoPP. Conversely, there are also some shortcomings: in addition to the material and experience differences, the two commodities content creators in Study 1 recommended themselves are not the same product (USB flash drive and movie tickets), so Study 1 cannot be ruled out the possibility that consumers are more willing to pay higher premium on USB flash drive rather than the movie tickets. In order to rule out such possibility, Study 2 will draw lessons from the previous experiential and material product research paradigm: packaging the same product into experiential products or material products (Goodman et al., 2019). In addition, Study 2 will verify the mediating effect of social comparison tendency. According to the hypothesis of this study, TikTok content creation platform improves the social comparison tendency of consumers, which, in turn, makes consumers more willing to pay higher premium for material products. A total of 225 Chinese adults, 134 of whom were female, with an average age of 32 (SD = 5.68), were recruited through questionnaire platform Credamo. Compared with Questionnaire Star platform, Credamo platform has the advantages of fast data collection, high questionnaire response rate, and better data quality. At the same time, the data collected by Credamo platform has been included in the data analysis by relevant studies, which proves that the platform has a good international recognition.

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Study 2 used a single-factor and two-level experiment process (TikTok content creators recommended product type: experiential vs. material), which experimentally manipulated the types of products the subjects saw and measured their WoPP for different types of products. The main process was basically consistent with Study 1. Major differences were that the subjects will see the different expressions of the same products, all subjects see the recommended products as a grill, but the material product group placed more emphasis on grill as a product in its own right, conversely the experiential group placed more emphasis on the nature of the grill to satisfy consumers' experience together with family and friends (see Figure 4). The rest remained consistent. After viewing the corresponding TikTok-recommended products, the subjects need to indicate to what extent they agree with the following statements: (1) Pay more for the product; (2) I can pay extra for this product; (3) It is acceptable to pay more for this product; and (4) I am willing to pay more for this product (α = 0.895). The subjects' social comparison tendency was then measured, and all of them were asked to say how much they agreed with the following statements at this moment in time: (1) I often compare my achievements in life to others; (2) If I want to know more about something, I try to know what other people think; (3) I always pay attention to: how am I doing things compared to other people; (4) I always compare what my loved ones (e.g., my boyfriend, girlfriend, family members, etc.) are doing with what other people are doing; (5) I always wonder what other people would do in a similar situation; (6) I'm not the kind of person who constantly compares myself to others; (7) If I want to know how well I am doing something, I compare what others are doing with what I am doing; (8) I often try to understand the opinions of others who are facing similar problems as I am; (9) In general, I like to discuss our opinions and experiences with others; (10) I never consider how my life compares to other people's; and (11) I often compare my social performance (e.g., social skills, popularity) with others (Baldwin and Mussweiler, 2018; α = 0.903). Next, since all the products used in this experiment were barbecue grills, it was necessary to conduct manipulation tests on the types of products perceived by the subjects. All the subjects were required to answer their perception of the advertised products in the first task (1, totally material products; 7, totally experimental products). Finally, they report their demographic information (income, gender, age, and education).

The material attributes perceived by the subjects in the material product group (M = 5.79, SD = 1.32) were significantly higher than those perceived by the subjects in the experiential product group (M = 1.64, SD = 1.68, $p < 0.001$), indicating that the manipulation of product types in this experiment was successful. The results of ANOVA convey that on TikTok platform, compared with experiential products, the subjects had higher WoPP on material product [$M_{\text{material products}}$ = 4.25, SD = 1.78 vs. $M_{\text{experiential products}}$ = 3.26, SD = 1.32, $F(1,223) = 3.879$, p = 0.014]. Therefore, hypothesis 1 is verified again. Compared with recommending experiential products on content creation platform, recommending material products is more capable to increase

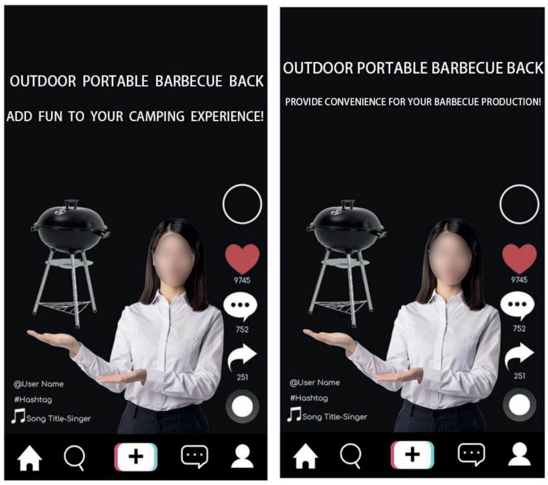

FIGURE 4
Study 2: Experimental materials.

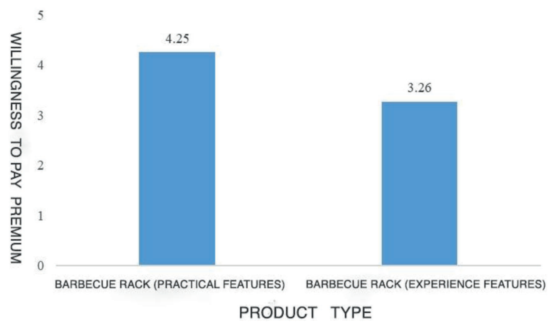

FIGURE 5
Result of study 2.

consumers' WoPP. The experimental results are shown in Figure 5. This study first tested the influence of TikTok's recommendation of material products (vs. recommendation of experiential products) on subjects' social preference. The results of one-way ANOVA showed that compared with the subjects in the group of TikTok-recommended experiential products (M = 5.41, SD = 0.79), the subjects in the group of TikTok-recommended material products had a higher tendency of social comparison [M = 5.64, SD = 0.80, $F(1,223) = 4.77$, p = 0.03]. Then, this study conducted mediating effect analysis to test that TikTok-recommended material products lead to consumers' higher WoPP by improving consumers' social comparison tendency. For this purpose, the Model 4 mediation Model was applied in this study (Preacher et al., 2007), taking the WoPP as the dependent variable, the recommended product type as the independent variable, and the social comparison tendency as the mediating variable. The analysis results of the final mediation model show that social comparison can mediate the impact of product types recommended by TikTok content creators on consumers' WoPP

(95% CI [0.06, 0.28] excluding 0). Consequently, Hypothesis 2 is verified: content creation platforms' recommendation of material products improves consumers' social comparison tendency, and higher social comparison tendency, in turn, increases consumers' WoPP for products.

To sum up, through the experiment, Study 2 revalidated hypothesis 1: compared with recommending experiential products on content creation platform, recommending material products is more capable to increase consumers' WoPP. More indispensably, Study 2 verified the mediating effect of social comparison tendency: content creation platforms' recommendation of material products significantly increases consumers' social comparison tendency compared with content creation platforms' recommendation of experiential products, and higher social comparison tendency conversely increases consumers' WoPP.

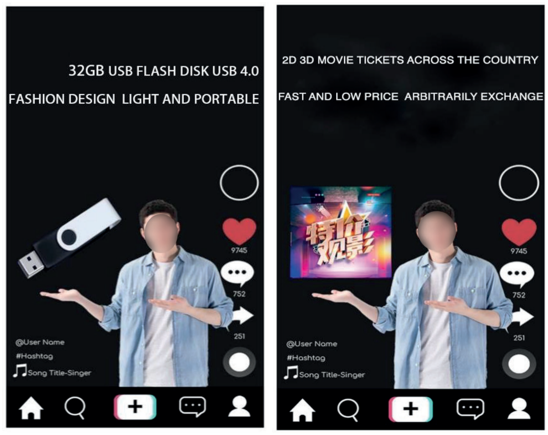

FIGURE 6
Study 3: Experimental materials.

Experimental study three: The moderating effect of consumer trust

Study 3 focuses on the moderating effect of consumer trust to enrich the theoretical contribution of this study and identify the possible individual influencing factors of consumers in the process of purchasing goods on social media platforms. At the same time, this study will also exclude the influence of host gender on consumers' WoPP for different product types. Previous studies have shown that the gender of spokespersons in advertisements may have a certain impact on consumers' evaluation of products (Azar et al., 2018). As a result, different experimental designs will be carried out in this study to exclude the potential influence of host gender on the experimental results. Similar to Study 1, 200 Chinese adults were recruited through the Chinese questionnaire collection platform (Questionnaire Star), including 126 females, with an average age of 32.69 (SD = 7.358).

Study 3 used a single-factor and two-level experiment process (TikTok content creators recommended product type: experiential vs. material), which experimentally manipulated the types of products the subjects saw and measured their WoPP for different types of products. In addition, this study will also measure the trust level of consumers (Yamagishi and Yamagishi, 1994). The main process of Study 3 was similar to that of Study 1 and Study 2. The subjects still saw two types of products: material products (USB flash drive) and experiential products (movie tickets). The advertisement is shown in Figure 6. The only difference between the experimental materials and the materials used in Study 1 is the host gender of the recommended product. In Study 1, the image of female recommender is used, while in Study 3, the image of male recommender is used to exclude the potential influence of gender on the product type effect. The specific product types and product descriptions were consistent with Study 1. After watching the pictures of TikTok's product introduction, the subjects indicated their WoPP through the scale: to what extent did they agree with the following statements: (1) Pay more for the product; (2) I can pay extra for this product; (3) It is acceptable to pay more for this product; and (4) I am willing to pay more for this product ($\alpha = 0.912$). After answering the WoPP, the subjects will receive a prompt informing that they are about to enter another study unrelated to the previous Tiktok questionnaire, in which the subjects will be asked some questions about their interpersonal relationship and communication. All the subjects need to answer to what extent they agree with the following views: (1) Most people are basically honest; (2) Most people are trustworthy; (3) Most people are basically kind; (4) Most people are trusting; (5) I always wonder what other people would do in a similar situation; (6) I trust people; and (7) When people are trusted by others, most of them will respond with kindness (Yamagishi and Yamagishi, 1994; $\alpha = 0.904$). Next, since the products used in this experiment are consistent with those in Study 1, for the sake of robustness, it is still necessary to conduct manipulation tests on the types of products perceived by the subjects. All the subjects need to answer their perception of the advertised products in the first task (1, completely material products; 7, totally experiential). Finally, they report their demographic information (income, gender, age, etc.).

Results showed that the material attributes perceived by the subjects in the material product group ($M = 1.86$, SD = 0.64) were significantly higher than those perceived by the subjects in the experiential product group ($M = 6.02$, SD = 0.54, $p < 0.001$). The manipulation of product types in this experiment is successful. The results of ANOVA showed that compared with TikTok-recommended experiential products, subjects had higher WoPP [$M_{\text{material products}} = 3.96$, SD = 1.37 vs. $M_{\text{experiential products}} = 3.39$, SD = 1.25, $F(1,198) = 3.327$, $p = 0.012$]. Therefore, hypothesis 1 is verified again. Compared with experiential products, TikTok recommends material products to make consumers more willing to pay premium. The experimental results are shown in Figure 7. At the same time, the main effect of the gender of TikTok hosts on the WoPP is not significant ($p > 0.05$), so the influence of gender on the results can

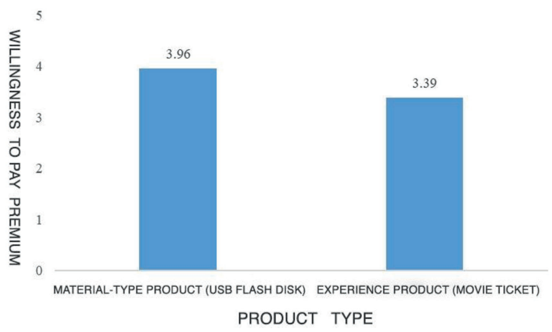

FIGURE 7
Result of study 3.

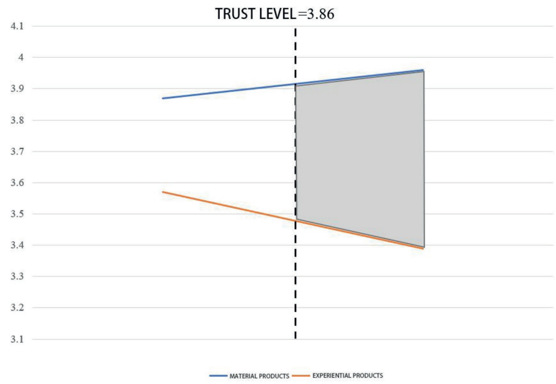

FIGURE 8
The moderation effect of trust.

be excluded. Then, the moderating effect of consumer trust as a moderating variable is analyzed. For this purpose, the Model 1 adjustment Model was applied in this study (Preacher et al., 2007), taking the WoPP as the dependent variable, the recommended product type as the independent variable, and consumer trust as the moderating variable. The analysis results of the final moderation model showed that consumer trust moderated the effect of product types recommended by TikTok content creators on consumers' WoPP ($p < 0.001$). At the same time, the searchlight effect analysis shows that when the consumer trust level is 3.86, the difference in WoPP between material products and experiential products starts to emerge (see Figure 8). Therefore, hypothesis 3 is verified: consumers have a higher degree of trust in the material products recommended by content creators on content creation platforms, and consumers with a lower level of trust are less willing to pay product premium on experiential products.

In conclusion, through the experiment, Study 3 revalidated hypothesis 1 again: compared with recommending experiential products on content creation platforms, recommending material products is more capable to increase consumers' WoPP. Different from the two studies above, Study 3 also verified the moderating effect of consumer trust: consumers with low levels of trust are more reluctant to pay product premium on experiential products. Furthermore, Study 3 also excluded a possible additional explanation—the gender of the host. The analysis results depict that gender has no significant impact on consumers' WoPP.

Discussion and conclusion

Research conclusion

This study mainly focuses on the cultural value co-creation of creators and consumer communities in social media platforms and users' WoPP, conducts an empirical test on the impact of product types on consumers' WoPP, and analyzes the results according to relevant data. Based on the results of the discussions and the experimental studies, this study confirms the mechanism consumer communities influence consumers' WoPP, portrays the relationship between the product types of the live streaming commerce and consumers' WoPP, and explores the mediating effect of social comparison and the moderating effect of consumer trust effect.

Firstly, this study introduces the consumer community and its unique language and culture, demonstrates the value of the language and culture co-created by creators and consumers, and further discusses the penetration and expansion of practice based on this phenomenon as a carrier. Secondly, the research sorted out the relevant theoretical results and put forward the hypothesis of this research according to the relevant conclusions of the consumer behavior research, clarified the research content and design of this research, and adopted the behavioral experiment method to verify the research hypothesis. Specific research steps are as follows: In this study, consumers' WoPP for different live-broadcast-recommended products (hedonic products and practical products) is taken as a proxy variable for brand advocacy in consumer value co-creation behavior (Ranjan and Read, 2016). Through a series of online experimental studies, we explore the potential connection between the two, identify the mechanism of action that affects the potential connection— social comparison— and find another variable that can moderate the relationship between the two— consumer trust.

Secondly, through the analysis results of three behavioral experiments, this study clearly shows the relationship between the types of products recommended by live streaming and consumers' WoPP. When content creation platforms recommend material products, consumers are more willing to pay premium than when they recommend experiential products.

Finally, this study also explores the mediating effect of social comparison and the moderating effect of consumer trust, summarizes the results of hypothesis testing, and analyzes and discusses the mechanism of causality and potential boundary conditions. It is found that content creation platforms' recommendation of material products significantly improves consumers' social comparison tendency compared with content creation platforms' recommendation of experiential products, and higher social comparison tendency, in turn, increases consumers' WoPP. Consumers with low levels of trust are more reluctant to pay product premium on experiential products. Through the spread of consumer trust and social comparison in the consumer community, the author affirms the language and culture co-created by the creator and the consumer community, proves the potential value of its creation, and has a positive impact on consumers' WoPP.

Theoretical implication

This study mainly contributes to the existing literature from the following aspects: Firstly, this study confirms that the value of language and culture co-created by creators and consumer communities, and finds that different types of recommended products can significantly affect consumers' value co-creation behavior—higher WoPP, which is helpful to better identify the relationship between product types and consumer value co-creation. Secondly, this study discovers the mediating effect of social comparison to further enriches the theoretical horizon of value co-creation, and provides a robust theoretical annotation for the potential links identified above from the perspective of causal inference. Finally, this study confirms the moderating effect of consumer trust which is also of practical significance for live streaming platforms. The moderating effect shows that building an advantageous trust mechanism through interaction with consumers, so as to better introduce the features and highlights of different products, can better improve the efficiency of live-streaming and thus increase profits.

Based on the three finding above, this study believes that the language and culture co-created by creators and consumer communities on content creation platforms, as the carrier of practice, can portray co-created value by consumers' WoPP. Compared with experiential products, material products can lead to a higher WoPP. Furhter, the relationship between the recommendation of material products and consumers' WoPP is mediated by social comparison tendency, and moderated by consumer trust.

Practical application

Many people may think that more product types and choices should be added to the live broadcast room so that consumers can have more opportunities to contact more products, and consumers' touch points should be increased through the launch and promotion of the live broadcast platform, to improve the sales efficiency and quality of the live broadcast room. However, this is not the case.

First, through the operation and maintenance of the consumer community, the creator creates the language and culture together with consumers, making it the "memory point" of the creator, which can promote the live broadcast of the creator more effectively and penetrate and spread in the consumer community, to contribute to WoPP. Second, just as many studies have found, material products and experiential products have distinct influences on consumers' perception and evaluation, including consumers' happiness (Boven, 2005), consumers' specific evaluation of products (Gilovich and Gallo, 2020), and the willingness of consumers to write product reviews (Gallo et al., 2019). By precisely arranging the types of products recommended through live streaming commerce, consumers can pay more premium. Third, according to the conclusion of this study, it is not difficult to find that on content creation platform, since consumers can know all aspects of the society from various views, such a diversified online environment is likely to stimulate consumers' social comparative psychology (Festinger, 1954). Also, the operation and maintenance of the consumer community, again, can contribute to a higher level of consumer trust.

After understanding such potential impacts, marketers and content creators engaged in live streaming commerce can better understand and recognize the nature of content creation platform, characters of consumer communities, and the properties of their own live stream, to make decisions that meet the needs of consumers and attract consumers and increase consumers' WoPP.

Research limitations and prospects

In this study, the three studies of product display are all recommend products on TikTok short-video platform. In future research, different platforms will be tried for product display, and a deeper inter-platform research will be conducted. Due to the short rise of the market, the quantitative measurement of concepts such as the co-creation value between creators and consumers and the degree of consumer trust is not exquisite enough. The measurement and quantification methods will be further explored in the future research to make a more refined, reasonable, and perfect quantitative comparison. Previous studies indicate that there may indeed be differences in user behaviors in different cultures. For example, considering the different relationship mobility between collectivism culture and individualism culture, there are differences in the content shared on relevant social media. Hence, accounting cross-cultural research in future research is salient and worth studying.

Data availability statement

The raw data presented in this article are not currently available, because there are still ongoing researches based on them. The raw data will be available from the corresponding author upon reasonable request.

Ethics statement

The studies involving human participants were reviewed and approved by the School of Economics Management, Harbin University of Technology, Shenzhen, China. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

JR, JY, and EL conceptualized the study and organized the data collection. JR and JY wrote the first draft of the manuscript. JY, EL and FH analyzed data and wrote the results section. FH revised important intellectual content and strengthened the research framework. All authors contributed to the article and approved the submitted version.

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Conflict of interest

FH was employed by Shenzhen Gengya Technology Co., Ltd.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Creating behavioral engagement among higher education's prospective students through social media marketing activities: The role of brand equity as mediator

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In today's competitive environment, higher education needs to find an effective way to convey its brand to prospective students. Given that the "digital native" (Gen Z) is becoming college aged, social media marketing has become an essential approach to engage with them. However, blasting out recruiting content on its social feeds just isn't working. By developing the higher education adjusted SMMA, structural equation modeling was adopted to figure out its effects on higher education brand equity and prospective student behavioral engagement, quantitatively. 356 3rd grade high school students in Indonesia were employed to assess the structural model. According to the findings of this study, SMMA has a considerable influence on brand equity and behavioral engagement, and brand equity has a noteworthy effect on behavioral engagement. Moreover, brand equity was found as a statistically meaningful mediator in the relationship between SMMA and behavioral engagement. The outcome advised the higher education need to organize its social in fun and interactive ways by leveraging higher education's SMMA as a pillar or benchmark on arranging social media posts and content. Yet, the content and posts should still need prioritize institution awareness and the good image of a higher education. The theoretical and managerial implication were discussed further.

KEYWORDS

social media marketing activities, brand equity, behavioral engagement, higher education, digital natives

Introduction

In today's competitive market, higher education must become more market-oriented by actively communicating its brand to their prospective students (Sujchaphong et al., 2017). Social media, such as YouTube, Facebook, Instagram, Twitter, Tik Tok, blogs, and so on, is a favorable way to reach out to customers and get their attention (Li et al., 2020). Since the prospective customers of higher education are generation Z—who were born from 1997 to 2012 and are commonly referred to as "digital natives" and heavily influenced by early access to the internet and online communication—connecting and engaging them through social media is promising (Seemiller and Grace, 2016). Even more, they shift their information-seeking behavior by using social media to seek particular information (Hamid et al., 2016).

Many factors play a role on prospective higher education students' decision about which college they want to attend. Factors such as institution recognition, learning environment, and country image (Hailat et al., 2021), educational establishments (James-MacEachern and Yun, 2017), employability, and community outreach (Miotto et al., 2020) unquestionably take a part in their complex decision-making process. Moreover, studies find parents have a substantial impact on their children's education decisions (Tillman, 2015; Workman, 2015; Rowan-Kenyon et al., 2016). However, more than half of Generation Z members (i.e., prospective students) said they consider their family members' opinions and perspectives, but, when making decisions, they still want to be listened, valued, and involved (Seemiller and Grace, 2016). Furthermore, when potential students have thousands of colleges to choose from, branding is one of the most influential ways to sway their decision. A higher education's brand is the expression of its defining characteristics that set it apart from the competitor, demonstrate its capacity to satisfy the needs of students, build conviction in its capacity to convey a specified type and quality of higher education, and assist prospective students to be well-informed about enrollment (Sujchaphong et al., 2017).

As a brand, higher education institutions need to explore the way they organize their social media posts and content to connect with prospective students. Brands shouldn't be afraid to actively communicate with customers and strongly promote their products on social media to raise levels of behavioral engagement (Malhotra and Malhotra, 2012). However, organizations need to be careful because the hard-selling approach simply doesn't work on social media. Their intention when they open social media is not to see ads milling about in their feeds. Lou et al. (2019) suggest that non-hard-sell branded content plays a crucial part in engaging with customers, boosting customer brand loyalty, and fostering long-term brand building. considering that prospective students may have never had any contact with a higher education, Dessart (2017) suggests that during the early phases of community building, it is even necessary to provide topical content that is unrelated to the business.

In the context of marketing activity content and posts, Kim and Ko (2012) initially developed the concept of social media marketing activity (SMMA), which emphasizes that the relationship between enterprises and their customers on social networks must be enjoyable, interactive, exhibit the latest trend, be customized among different customer segments, and demonstrate word-of-mouth. Other than mentioned by Kim and Ko (2012) and Yadav and Rahman (2018) argue that SMMA in the perspective of e-commerce, informative posts related to the brand are necessary. Hence, the SMMA concept is very likely to be adapted as a benchmark for organizing higher education's social media and pleasantly reaching prospective students. SMMA is based on the idea that differentiating communication characteristics into functional (cognitive) and emotional (affective) values is an effective technique to express the higher education brand (Palacio et al., 2002).

The general concept of applying social media to engage with potential students through a branding strategy is convincing. However, no prior research has investigated this topic in-depth, specifically on how higher education institutions' social media should be managed. Meanwhile, consumer engagement is often recognized as an important sign of digital customer relationship management (Hao, 2020), which becomes a trigger for customer buying intentions and decisions (Kumar et al., 2016). Davis et al. (2002) suggest that pre-purchase interactions must be planned to influence consumer perceptions and expectations of the brand, raise brand awareness, and promote its relevance. Organizations should tell potential customers why their brand is better than the competition and how it can help them get what they want and need.

This research extends the existing literature and provides empirical evidence about how social media posts and content influences consumer engagement behavior via brand equity. The current SMMA idea provided by Kim and Ko (2012) will be explored and developed further, with the addition of dimensions that complement it, to reinforce its role even more. This study proposes the SMMA concept as a benchmark or pillar in organizing higher education's social media to generate positive effects on brand equity. Furthermore, common opinion says that customer engagement comes after brand equity (brand awareness and brand image). Thus, it is important to look into how the brand equity created by SMMA affects how customers behave.

Literature review

Social media marketing activities

The initial concept of SMMA was developed by Kim and Ko (2012). They characterize SMMA as a mutual communication that tries to evoke empathy from adolescent users toward established luxury fashion brands. They identify SMMA comprising of five features: entertainment, trendiness, customization, interaction, and word of mouth. According to their findings, SMMA improves customer equity elements (value, relationship, and brand) in the setting luxury apparel business. Many researchers have used this SMMA framework to evaluate cases in a variety of contexts and settings, including brand communities (Chen and Lin, 2019), the leather industry (Khajeh Nobar et al., 2020), Korean cosmetics (Choedon and Lee, 2020), online shopping (Zarei et al., 2021), ride-hailing apps (Moslehpour et al., 2021), Facebook coffee-shop page (Ibrahim et al., 2021), and e-brands (Chen and Qasim, 2021). Most of them consider the SMMA dimensions by Kim and Ko (2012) as a robust SMMA construct. Meanwhile, Yadav and Rahman (2017) formulate the updated dimension and scale of SMMA in the context of e-commerce. They assert that because e-commerce represents a novel industrial setting in terms of both consumer and industry characteristics, a distinct scale to assess perceived SMMA is required. They offer an updated dimension of SMMA: interactivity, personalization, informativeness, trendiness, and word-of-mouth, in which there are some differences from the dimensions proposed by Kim and Ko (2012). Based on the aforementioned study, there are no definite dimensions of SMMA that can explain the general setting and context. Thus, the dimensions of SMMA follow the respective industries.

This study tries to expand the perceived SMMA by developing its dimension that is relevant to the perspective of marketing of higher education. The comprehensive view of SMMA by Kim and Ko (2012) as well as Yadav and Rahman (2018) are further discussed in this study. The dimensions of interactivity, trendiness, and WOM were involved in both studies, as well as customization and personalization dimensions, which are almost similar in definition, were adopted in this study. The dimensions of entertainment mentioned by Kim and Ko (2012) and informativeness mentioned by Yadav and Rahman (2018) were also adopted. Thus, this study used entertainment, information, interactivity, personalization, trendiness, and word-of-mouth (WOM) to describe the SMMA. These dimensions guide how the university-related (de Vries et al., 2017) or non-university-related (Dessart, 2017) posts or content are shared on social media.

Additionally, perceived institutional credibility is relevant to this discussion. Higher education credibility is one of the most discussed and increasingly practiced in the context of new student admissions. The notion of "institutional credibility" refers to the ranking, press reviews, and other information that demonstrates the university's status and reputation (Lim et al., 2018). According to previous studies, perceived institutional credibility is a significant component in student decision-making while pursuing an education (Nguyen and Leblanc, 2001; Hemsley-Brown and Oplatka, 2006; Kaushal and Ali, 2019). Internal and external stakeholders are increasingly demanding improved outcomes in research, education, knowledge handover, employment, and group engagement (Miotto et al., 2020). Therefore, considering credibility dimensions as part of the perceived SMMA dimension is essential to creating a comprehensive view of SMMA from the higher education perspective. **Table 1** exhibits the definition of each SMMA dimension, as well as **Table 2** presents the operational definition of SMMA used in this research.

Brand equity

The idea of brand equity is based on two strongly held beliefs established by Aaker and Keller, which have so far led the majority of researchers. Aaker (1992) identifies brand equity as a brand's assets and liabilities, but does not specify whether they are consumer- or customer-based. He proposes a new terminology for brand equity: consumer-based brand equity (CBBE), which entails of four elements: brand loyalty, brand

TABLE 1 Definition of SMMA dimensions.

Dimensions	Definition	References
Entertainment	The extent to which social media posts and content are entertaining, fun, or enjoyable.	Kim and Ko (2012)
Informativeness	The extent to which social media posts and content show accurate, useful, and comprehensive information.	Yadav and Rahman (2017)
Interactivity	The extent to which social media posts and content demonstrate customers' sharing ideas, views, or direct interactions with the organization itself or other customers.	Kim and Ko (2012)
Personalization	The extent to which social media postings and content show personalized material to meet a customer's preferences.	Yadav and Rahman (2017)
Trendiness	The extent to which social media posts and content demonstrate current events, breaking news, or hot debate topics.	Kim and Ko (2012)
Word-of-Mouth	The extent to which social media posts and content demonstrate positive testimonials from students, lecturers, partners, or stakeholders.	Adjusted to the research context
Perceived Institution Credibility	The extent to which social media posts and content demonstrate the organization's achievement or reputation.	Adjusted to the research context

TABLE 2 Operational definition.

Construct	Operational definition
Higher Education's SMMA	A tool used to manage social media in higher education, such as Instagram, Facebook, Twitter, Youtube, and Blog, to attract potential students in a way that is entertaining, interactive, informative, personal, shows the latest updates or news, emphasizes word-of-mouth, and shows the institution's credibility.
Higher Education Brand Equity	The value of a higher education institution's brand comprises a prospective student's awareness of a higher education institution's brand and the image that they make with the higher education institution.
Prospective students' behavioral engagement	The amount of time, effort, and energy a potential student spends reading, interacting with, and feeling connected to posts or content related to or unrelated to higher education, whether they were made by a higher education initiator or by the prospective student themselves. This is because they want to get closer to each other and find out more about college.

association, brand awareness, and perceived quality. Referring to Keller (1993), CBBE is defined as the differential effect of brand knowledge on consumer reaction to brand marketing. His idea of brand equity is the most important one, because it connects its two parts, brand awareness and brand image. However, Aaker (1996) mentions that the concepts and dimensions of brand equity may develop or change as a consequence of the distinctive nature of various product contexts. Yet, the researchers still need to provide evidence for the relevance and necessity.

In this study, brand equity follows SMMA as its antecedent and as a construct that affects prospective students' engagement intentions. Given that deciding on the right college needs a long consideration, engagement refers to a prospective student's attitudes toward the higher education institution that occur in the primary steps of their decision-making process. Based on Aaker (1996), he implies that brand awareness is the primary factor influencing customers' perceptions and attitudes. Since the branding strategy comes before attitudes (prospective students' engagement intention), the dimension of CBBE proposed by Aaker (1992) has no relevance in this study. This is supported by Tasci (2016, 2018), who posits that when he tested the CBBE model's cross-brand validity, he used brand familiarity (awareness) and brand image as the launchpad elements that highly influence the whole model he tests. Tasci (2021) indicates that the brand equity components (brand loyalty, brand association, brand awareness, and perceived quality) were not equal in one line. He reconstructed the perception of brand equity by placing perceived quality and brand loyalty as components that are influenced by brand awareness and brand image. Grounded on above discussion, the brand awareness and brand image as a components of brand equity were used in this study. **Table 2** demonstrate the operational definition of brand equity used in this research.

Creating brand equity has obvious advantages. Brand equity is the perceived value of a brand in the minds of consumers. "Brand equity" is a signaling phenomenon that ensures the product's high quality (Hazée et al., 2017). According to Carvalho et al. (2020) brand equity has become an essential concept for higher education institutions. Choosing a higher education is a long-term personal investment for prospective students that will decide their professional future. As a result, brand equity can act as a risk mitigator, influencing the choice of a higher education institution (Mourad et al., 2011). According to Royo-Vela and Hünermund (2016), when information reaches a prospective student, it is more likely to be favorably received and responded to because of prior positive associations with the brand. As an outcome, prospective students are likely to compare institutions' brand equity while selecting a higher education institution.

Brand awareness

Rossiter and Percy (1987) were the first to define Brand awareness is defined as customers' capacity to identify the brand in a variety of situations. This shows how strong the brand node, or memory of this brand is. High levels of consumer awareness are expected to facilitate information processing, decrease risk and ambiguity, and foster favorable feelings toward an object (Tasci and Boylu, 2010). Keller (1993) states that CBBE arises once the customer is aware of the brand, is familiar with it, and has positive, strong, and distinctive memories associated with it. Recently, Bergkvist and Taylor (2022) Using previous research and current advertising industry trends, the new explanation of brand awareness is the possibility that a individual would remember a brand name, a product classification, or a category requirement in a range of brand-relevant situations. Brand awareness is a way to measure how well customers can tell the difference between a company's name, products, or services and those of its competitors.

Brand image

A brand image makes an impression. According to Keller (1993), brand image is described as a brand's opinions. The brand's image acts as the focus point for information in customers' memories about the brand's advantages, benefits, and sentiments (Aaker, 1992, 1996). The brand image is what customers think and feel when they hear or see an institution's or brand's name (Mothersbaugh et al., 2020). Rethinking the idea of brand image is necessary given the rapid technological improvements, digital (online) innovations, and societal and environmental constraints (Gürhan-Canli et al., 2016). A brand image may also be looked at as a set of customer ideas about a product or service that are typically arranged to convey a meaning.

Behavioral engagement

Engagement can also be thought of as the interaction with content. In this research, behavioral engagement is more than just customers' intention to follow a social media account. The total of time, attempt, and energy spent by a customer on a brand during a given consumer-brand encounter is referred to as "digital behavioral engagement" (see **Table 2**). Vivek et al. (2014) demonstrate that this kind of relationship is the extent to which an individual engages with an organization's services or activities and feels connected to them, which is begun by the customer or the organization. Customer engagement is valuable to firms because it generates positive outcomes, including self-brand relationship and brand usage intention (Harrigan et al., 2018). Engaging content is a criterion for the beneficial effects of social media success (i.e., the number of reaches, likes, and shares) that may turn into positive sales performance (Ha et al., 2016) and branding (Hudson et al., 2016).

In the context of higher education, when a prospective student engages with the higher education institution's social media, the higher education has an opportunity to convince them by sharing beneficial information. Because customers spend so much time on social media, there's a significant likelihood they'll participate in social brand activities (Osei-Frimpong and McLean, 2018). The engaging prospective student will enjoy and show a positive attitude toward posts issued because of the desire to learn more about this higher education institution. In other words, the possibility of prospective students choosing this higher education has increased.

Hypotheses development

SMMA, with its dimension, has been addressed as a predictor of customer-based brand equity in many settings (Kim and Ko, 2012; Godey et al., 2016; Yadav and Rahman, 2017; Ibrahim et al., 2020). Furthermore, in social media marketing research, brand equity has been analyzed as a second-order object with two dimensions (Barreda et al., 2015; Seo and Park, 2018), namely brand image and brand awareness. Ibrahim et al. (2020) recently reported a meta-analysis study looking at the correlation between SMMA and brand equity, as well as purchase intention. According to the findings, there is a substantial relationship between SMMA and brand equity. The above discussion supports the premise that, when a student is deciding which institution to attend (i.e., tied to a higher education brand), prospective students will heavily rely on social media to assist and guide them in their college selections. As a result, having a robust social strategy is essential since, in this study, SMMA was set up to be a tool for social media management. Thus, this study proposed H1.

> **H1:** SMMA has a significant influence on brand equity.

Schreiner et al. (2021) uncovered that the attractiveness of a social media post and its high media richness (e.g., the inclusion of elements like photos or videos) positively influenced engagement behaviors. While enjoyable content induced more sharing activity than incentive content, incentive content elicited more "like" behavior (Luarn et al., 2015). Customers in the tourist industry believe that postings or content linked to their interests are more pleasing, fascinating, or amusing, prompting them to share, like, or comment on it (Onofrei et al., 2022). In the luxury brand context, customers' perception of the relevance of the post or content is one of the key drivers of their engagement on Facebook and Instagram (Bazi et al., 2020). A humorous type of post or content that isn't specifically about a product is recognized as being crucial for increasing customer engagement (Ge and Gretzel, 2017). This research proposes SMMA with its dimensions as a strategy for organizing higher education's social media. Using SMMA, the content or post on social media has to be entertaining, share relevant information, be interactive, personal, demonstrate recent updates or news, emphasize word-of-mouth, and show the institution's credibility. Therefore, with such diverse and not boring content, it can be expected that prospective students will incline to be more involved, as one of their initial efforts to find out more about the college they want to go to. Thus, H2 is proposed.

> **H2:** SMMA has a significant influence on engagement behavior.

Maintaining consumers' positive associations with brands has become a crucial component of a marketing strategy to encourage behavioral engagement. A recent study discovered that CBBE influences customers' engagement behavior in favor of brands on social media (Schivinski et al., 2019). In the short and medium terms, a brand with engaged customers will experience beneficial financial and non-financial effects (van Doorn et al., 2010). In the setting of a luxury brand, both brand equity dimensions (brand image and brand awareness) have been shown to be significant predictors of customer engagement behavior (Gallart-Camahort et al., 2021). Moreover, the way the brand communicates with the customers confidently impacts the degree of customer brand engagement (Gómez et al., 2019). A well-thought brand, along with a set of effective techniques, will help higher education to easily interact with users on social networks. Brand equity comes first when designing a brand strategy. The prospective student should be able to recognize higher education names among competitors and recall them. Higher education should work to increase brand engagement in order to pique the interest and decision-making of potential students. Thus, H3 is proposed.

> **H3:** Brand equity has a significant influence on engagement behavior.

Research methodology

Data collection and sample profile

From February 2022 to June 2022, data was collected via a web-based online questionnaire. The close-ended statement was used to ask for the level of the respondent's agreeableness in the form of a 1 (strongly disagree) to 7 (strongly agree) point Likert scale. Purposive sampling was utilized to explain a certain subject, idea, or phenomenon based on the needs of the individual informants (high school students). However, the study's population size was unknown. Thus, in business research, a convenience technique was used since it provides an accessible form of data gathering.

Afterward, a link to the measurement items was distributed to Indonesian third-grade high school students. The research objective is to assess what makes a prospective student decide to build engagement with their future college on social media in order to strengthen their decision about which college they want to go to. In this research context, the prospective students refer to high school students. Thus, third-grade high school students were considered an appropriate sample for this study.

The study's objectives, researchers' contacts, data collection methods, data protection concerns, and ethical considerations were all covered on the questionnaire's front page. In all, 371 answers were received. However, 356 valid responses were accepted for further analysis after 15 questionnaires had incomplete responses. The gender distribution of respondents is quite even. Meanwhile, for the age distribution of respondents, in Indonesia, the average age of 3rd grade high school students is 17–19 years old, but most of them are 17 years old. Therefore, in this study, respondents aged 17 years dominated. Table 3 displays the demographic information for the research's sample.

TABLE 3 Demographic information.

Dimension	Item	Frequency	Percentage (%)
Gender	Male	166	46.63
	Female	190	53.37
	Total	356	100
Age	17 years old	297	83.43
	18 years old	43	12.08
	19 years old	16	4.49
	Total	356	100

TABLE 4 Final measurement item.

Construct	Questions/Statements
SMMA dimensions	
Entertainment (Kim and Ko, 2012)	
ENT1	I prefer HE's social media to post fun things.
ENT2	Entertaining content on HE's social media seems interesting to me.
Informativeness (Yadav and Rahman, 2017)	
INF1	I enjoy reading insightful posts on HE's social media.
INF2	Useful information on HE's social media seems interesting to me.
INF3	The information provided by HE's social media is comprehensive
Interactivity (Kim and Ko, 2012; Yadav and Rahman, 2017)	
INT1	I'm impressed when HE uses social media to regularly interact with its followers.
INT2	I like interactive activities when looking at a HE's social media posts or content.
INT3	It's interesting if HE's social media posts encourage followers' conversation.
Personalization (Yadav and Rahman, 2017)	
PER1	I'm pleased if HE's social media posts align with what I want to see.
PER2	I feel connected when HE's social media posts as per my preferences.
PER3	I prefer it if the information shared by HE on social media is related to my interests.
Trendiness (Kim and Ko, 2012; Yadav and Rahman, 2017)	
TRE1	I'm interested if HE's social media shares the latest information.
TRE2	I think recent info, news, or events are important for HE's social media to post.
TRE3	I prefer it if HE's social media shares trendy information.
Word-of-mouth (developed by author)	
WOM1	A content about alumni success stories really inspires me.
WOM2	Positive comments, impression or testimonials from active students, lecturers, college partners need to be posted in HE's social media.
WOM3	Reposting a followers-generated-content (i.e., mentions) can broaden my understanding of the higher education.
Institution credibility (Merchant et al., 2015; Kethüda, 2022)	
INC1	It is important to post higher education achievements on social media.
INC2	I'm interested in knowing about good higher education activities.
INC3	When I think about a certain higher education, I am reminded of a graduate who has the proper knowledge and skills.
Brand equity	
Brand awareness (Seo and Park, 2018)	
BRA1	Because of social media activities, I'm always aware of HE's name.
BRA2	Because of social media activities, I'm aware of the characteristics of a HE.
BRA3	Because of social media activities, I can always remember the logo of a HE.
Brand image (Seo and Park, 2018)	
BRI1	Through their social media, HE can show a positive image.

(Continued)

TABLE 4 (Continued)

Construct	Questions/Statements
BRI2	I can be impressed with HE's good social media activity.
BRI3	I respect to a HE considering what they post on social media.
Behavioral engagement (Mirbagheri and Najmi, 2019; Ni et al., 2020; Cheung et al., 2021)	
BVE1	Following HE's social media posts can improve my knowledge of HE.
BVE2	I prefer to check out a college's social media profiles when I want to learn more about it.
BVE3	I would like to read content posted by HE's on their social media.
BVE4	I'm satisfied with my relationship with a particular HE's social media account.

Measurement item

The measurement items of the previous study were employed as the basis for this research's measurement items due to the validity of the questionnaire contents have been properly verified yet adjusted for this study's context and settings. The measurement items of SMMA dimensions were taken from the statement that was used in Kim and Ko (2012) and Yadav and Rahman's (2017) research. However, because the word-of-mouth notion in the two above mentioned studies was slightly different, the author devised the measuring item grounded on the concept given in the previous section. The institution credibility items as a complement to the SMMA concept in the context of higher education were retrieved from Kethüda (2022) and Merchant et al. (2015). Brand equity measurement items, which included its two elements (brand awareness and brand image), were extracted from Seo and Park (2018). Finally, the measurement items of behavioral engagement were adapted from various sources (Mirbagheri and Najmi, 2019; Ni et al., 2020; Cheung et al., 2021) and being adjusted to the context of this research.

A pilot study was conducted to evaluate the responsiveness's accuracy and consistency. A pretest was conducted involving 20 people from the target group (high school students). Furthermore, the questionnaire was evaluated from a marketing professor's perspective. Moreover, language experts who understand both languages (English and Bahasa Indonesia) were involved. Given that the questionnaire reference was in English, while the question or statement was intended for Indonesians, it must be interpreted clearly. Some changes were made to reduce the ambiguity (**Table 4**).

Data analysis

The research framework was developed based on higher-order constructs (Sarstedt et al., 2019). SMMA and brand equity act as higher-order constructs, whereas the respective dimensions act as lower-order constructs. The interaction between the higher-order component and its lower-order components is referred to as the reflective-reflective higher-order type (Ringle et al., 2012) (see **Figure 1**). In two stages, estimation and partial-least-square structural equation modeling (PLS-SEM) studies were performed. The first step is outer model assessment to assess the reliability and validity of an established model. The inner model assessment comes next to evaluate the hypotheses' connection. PLS was chosen because it can handle model constructs and measurement items concurrently and is appropriate for examining the causal linkages between construct variables (Petter et al., 2007).

Outer model and scale validation

An outer model evaluation was conducted to evaluate the quality of the construct. The construct's quality assessment starts with factor loading, followed by construct validity and construct reliability (see **Table 5**). The amount to which the item in the correlation matrix correlates with the given main component is referred to as factor loading. Suggested by Hair et al. (2016), the factor loading should be more than 0.50. Hence, no item in the study had a factor loading fewer than the suggested value, hence, the factor loading is not the issue in this research. A reliability analysis was presented to measure the instrument stability and consistence. In this research reliability test, Cronbach's alpha and composite reliability were employed. Both Cronbach's alpha and composite reliability ranged from 0.752 to 0.903 and 0.871 to 0.966, respectively, which is greater than the suggested limit of 0.70 (Hair et al., 2014). Therefore, these research constructs are reliable.

The validity of constructs was tested using two approaches: convergent validity and discriminant validity. Convergent validity is a parameter that ensures that two or more measures of the same entity differ significantly (Bagozzi et al., 1991). A valid construct (item converge to measure the underlying construct) is represented by an AVE value of more than 0.50 (Fornell and Larcker, 2018). In this research, the AVE value grater was 0.50, so convergent validity is established. Discriminant validity testing was done to make sure that the measurement items were different and distinct. Each measurement item needs to be unique and not highly correlated with each other (Bagozzi et al., 1991). Agreeing to Fornell and Larcker (2018), discriminant validity is demonstrated when the square root of AVE for each concept is larger than its correlation with all other constructs. In this research, the construct's square root AVE (in bold) was shown to be stronger than its correlation with the other constructs. As a result, the test offers substantial support for establishing discriminant validity (see **Table 6**).

As part of the measurement model evaluation, these higher-order constructs (SMMA and Brand Equity) are also

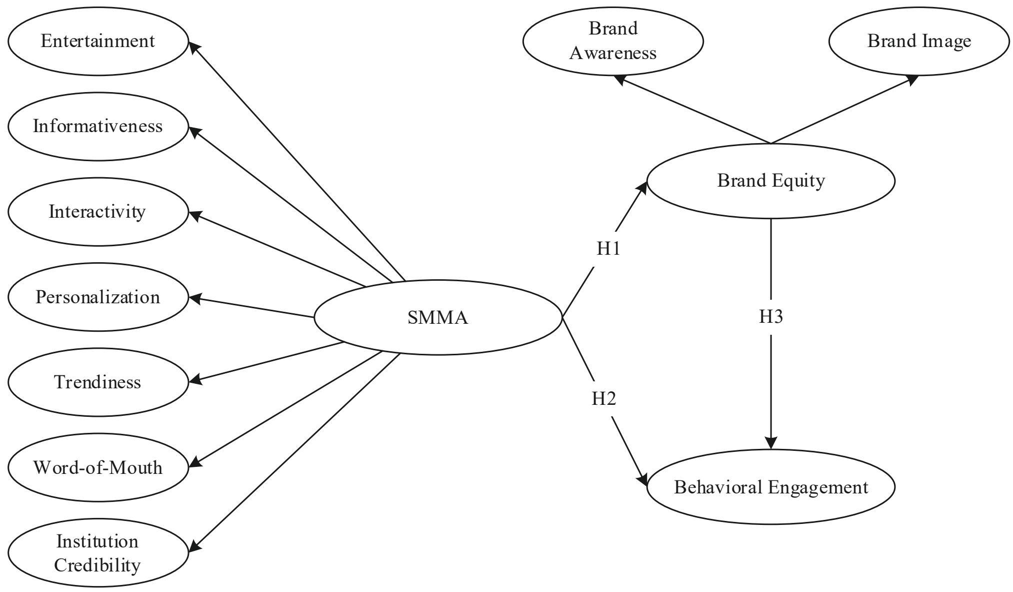

FIGURE 1
Research framework.

evaluated. The reliability and convergent validity of each of these constructs were evaluated. Furthermore, as advised by Sarstedt et al. (2019), the higher order construct was examined for discriminant validity with the other lower order construct in the research. The outcomes of the higher order construct's reliability and validity demonstrate that both reliability and validity were established. The result of the higher order reliability (Cronbach's alpha and composite reliability) is larger than 0.70 and the AVE is larger than 0.5 (see **Table 7**). Moreover, the result of Fornell and Larcker's discriminant validity indicates that AVE's square root (in bold) of the construct is higher than its correlation with all other constructs (see **Table 7**).

Additionally, CMV (common method variation) might be a significant issue for any self-reported data on SEM. The presence of CMV in the dataset indicates that the results are not analytically valid. To address this problem, this study used Harman's one-factor examination to determine the presence of the CMV (Podsakoff et al., 2003). A single factor is extracting 45.882% of the total variance. Since it is fewer than 50%, it can be concluded that there is no threat of CMV.

Lastly, to understand the overall quality of the suggested model, this study estimated the Goodness of Fit (GOF) as Tenenhaus et al. (2005) suggested. The GOF is determined as follows:

$$GOF = \sqrt{\overline{AVE} \times \overline{R^2}} = \sqrt{0.772 \times 0.609} = 0.686 \quad (1)$$

This research GOF value is 0.686, which surpasses the cut-off threshold of 0.36 for a substantial outcome size (Wetzels et al., 2009).

Inner model result

Structural equation modeling, or inner model, is an assessment of the hypothesized relationship to substantiate the proposed hypothesis. The weight of each path coefficient was estimated using bootstrapping. Re-sampling data was utilized to estimate the values, and the calculated values were more exact than the usually used limit approximation value (Purvis et al., 2001). As a result, this technique was utilized in this study to assess the significant relationships between variables (**Table 8**). **Figure 2** present the tested hypotheses in this study. The analysis shows that SMMA had a significant effect on brand equity ($\beta = 0.768$; t-value = 22,976; $p < 0.001$). Thus, hypothesis 1 was supported. Furthermore, SMMA had a significant impact on behavioral engagement ($\beta = 0.306$; t-value = 5,098; $p < 0.001$), supporting hypothesis 2. Finally, brand equity had a significant consequence on behavioral engagement ($\beta = 0.533$; t-value = 0.533; $p < 0.001$).

The inner model assessment is also used for estimating the R-square and path coefficient. **Figure 2** presents the R-square value and path coefficient of this research's structural model. R-square statistics reflects the variation in the dependent variable is clarified by the independent variable. Simply expressed, it refers to how much conversion in the dependent variable can be explained by one or more independent variables. In this research, brand equity was influenced by SMMA with an R-square value of 0.590. Meanwhile, the behavioral engagement variable was influenced by SMMA and brand equity with an R-square value of 0.628. This result explains that a 59.0% change in brand equity was caused by SMMA,

TABLE 5 Factor loading, construct validity, and reliability.

Item	Factor loading	Cronbach's alpha	Composite reliability	AVE
ENT1	0.881	0.752	0.889	0.801
ENT2	0.908			
INF1	0.915	0.903	0.939	0.838
INF2	0.938			
INF3	0.892			
INT1	0.805	0.821	0.894	0.737
INT2	0.885			
INT3	0.884			
PER1	0.888	0.834	0.900	0.751
PER2	0.905			
PER3	0.804			
TRE1	0.939	0.948	0.966	0.905
TRE2	0.953			
TRE3	0.962			
WOM1	0.869	0.891	0.932	0.821
WOM2	0.926			
WOM3	0.923			
INC1	0.872	0.876	0.923	0.800
INC2	0.910			
INC3	0.901			
BRA1	0.816	0.804	0.884	0.718
BRA2	0.872			
BRA3	0.854			
BRI1	0.833	0.778	0.871	0.693
BRI2	0.867			
BRI3	0.794			
BVE1	0.694	0.822	0.883	0.654
BVE2	0.817			
BVE3	0.837			
BVE4	0.877			

ENT, entertainment; INF, informativeness; INT, interactivity; PER, personalization; TRE, trendiness; WOM, word-of-mouth; INC, institution credibility; BRA, brand awareness; BRI, brand image; BVE, behavioral engagement.

while a 62.8% change in the behavioral engagement variable was caused by SMMA and brand equity. Since Hair et al. (2013) recommend that the R-square values of 0.75, 0.50, and 0.25 for the dependent latent variable can be described as substantial, moderate, and weak, respectively. Thus, the outcome indicates that both dependent variables (brand equity and behavioral engagement) are moderately explained by each independent variable. The path coefficients (or β-values) represent the hypothesized relationships or the strength of the relationship between independent and dependent variables. The path coefficient close to +1 indicates a strong positive relationship. The closer the path coefficient's value to 0 means a weaker relationship. The two paths (SMMA → BE and BE → BVE) show strong relationships (0.768 and 0.533, respectively), whereas the other path (SMMA → BVE) shows a weak relationship (0.306).

Mediation test

The mediation analysis was attempted to explore the mediation consequence of brand equity in the connection between SMMA and behavioral engagement in order to determine whether the mediation model provided in this research was statistically considerable. The results (**Table 9**) show that SMMA had a significant total effect on behavioral engagement ($\beta = 0.715$; t-value = 21.858; $p < 0.001$). With the mediating variable (brand equity) included, the impact of SMMA on behavioral engagement remains significant ($\beta = 0.306$; t-value = 5.098; $p < 0.001$). Through brand equity, the indirect effect of SMMA on behavioral engagement was found to be significant ($\beta = 0.409$; t-value = 8.284; $p < 0.001$). This calculation reveals that the relationship between SMMA and behavioral engagement is partially mediated by brand equity.

Discussion

The interest in studying the benefits of social media on an organization was increasing, as well as how they played a role in the organization's brand building (Zollo et al., 2020). Nonetheless, researchers need to work harder to discover real-world instances of how social media impacts brand equity and how this shapes other valuable branding goals, such as getting customers to act in a certain way. Agreeing to Dwivedi et al. (2021), social media is always in beta mode due to its constant change and consistency in releasing new functions and features. This makes analyzing social media as a research topic always challenging. Moreover, Schultz and Peltier (2013) added that due to the various conceptual and measurement issues, research must be expanded in the realm of social media. This research fills an essential divergence in the literature by conducting a research on how higher education uses social media.

This study delivers suggestion of how important higher education's social media activities are in shaping their brand awareness as well as brand image, which results in prospective students' behavioral engagement. The result shows that the SMMA with its dimensions has a clear impact on higher education brand equity, which consists of brand awareness and brand equity. The adoption of various social media channels is essential for developing an effective higher education brand since the target is a "digital native." Moreover, the results demonstrated that brand equity has a significant influence on prospective students' behavioral engagement. While customers pay attention in a positive way, there is a willingness to learn more about a particular product. In the prospective

TABLE 6 Forner and Larcker discriminant validity.

	BRA	BRI	BVE	ENT	INC	INF	INT	PER	TRE	WOM
BRA	**0.848**									
BRI	0.643	**0.832**								
BVE	0.723	0.669	**0.809**							
ENT	0.591	0.613	0.606	**0.895**						
INC	0.512	0.491	0.466	0.490	**0.895**					
INF	0.541	0.640	0.550	0.708	0.481	**0.915**				
INT	0.577	0.636	0.626	0.694	0.449	0.780	**0.859**			
PER	0.482	0.577	0.592	0.588	0.462	0.649	0.654	**0.867**		
TRE	0.511	0.579	0.564	0.586	0.451	0.644	0.646	0.714	**0.951**	
WOM	0.592	0.544	0.612	0.556	0.505	0.504	0.558	0.532	0.492	**0.906**

ENT, entertainment; INF, informativeness; INT, interactivity; PER, personalization; TRE, trendiness; WOM, word-of-mouth; INC, institution credibility; BRA, brand awareness; BRI, brand image; BVE, behavioral engagement. The bold character is AVE square root.

TABLE 7 Higher-order construct reliability and convergence validity, as well as the discriminant validity of Fornell and Larcker criterion.

	Cronbach's alpha	Composite reliability	AVE	BE	SMMA
BE	0.783	0.902	0.821	**0.906**	
SMMA	0.906	0.926	0.642	0.778	**0.801**

BE, brand equity; SMMA, social media marketing activities. The bold character is AVE square root.

TABLE 8 Summary of hypothesis testing result.

Hypothesis	Path	Standardized path coefficient	*t*-value	Conclusion
H1	SMMA → BE	0.768***	22.976	Supported
H2	SMMA → BE	0.306***	5.098	Supported
H3	BE → BE	0.533***	9.016	Supported

BE, Brand Equity; SMMA, Social Media Marketing Activities; BE, Behavioral Engagement. ***$p < 0.001$. Number of bootstrap samples = 10,000.

student context, that kind of desirability plays a part in their long-decision-making process while choosing a college that they want to attend.

Theoretical implication

This research helps us learn more about the marketing of higher education in a multiple of approaches. First, this research adds to the body of knowledge on social media marketing by creating an instrument to measure how SMMA is regarded in the perspective of higher education. The current SMMA concept remains adopted, but there are some adjustments in the concept of word-of-mouth and attaching the perceived institution credibility. Previously, word-of-mouth as a part of SMMA dimensions (Kim and Ko, 2012; Yadav and Rahman, 2017; Seo and Park, 2018) was defined as the creation of shareable content to generate customers' positive word-of-mouth (user-generated-content). However, in the context of higher education, this understanding still needs to be expanded. In addition to the understanding described above, the word-of-mouth concept was developed into the degree to which prospective students perceive positive word-of-mouth from higher education stakeholders who recommend and share experiences about the institution on social media. Additionally, institution credibility needs to be employed as the complement of perceived SMMA in the higher education context, since institution credibility is considered as an notable aspect in prospective students' decision-making path when selecting a college to attend (Nguyen and Leblanc, 2001; Hemsley-Brown and Oplatka, 2006; Kaushal and Ali, 2019).

Second, this examination adds to the existing research by showing a complete framework for how SMMA affects brand equity and how customers behave when they interact with an organization. Although past literature acknowledged the importance of certain SMMA aspects (Godey et al., 2016), our empirical research demonstrates their relative relevance and demonstrates that when designing social media operations, all five factors should be evaluated as a whole. All five dimensions of SMMA stand out from the perspective of a potential student.

Third, this study analyzes the evolution of the notion of behavioral engagement in the perspective of higher education. A previous study defined engagement intention or participation intention as a customer's propensity to follow, like, remark on, or share an organization's generated content (Onofrei et al., 2022). However, in the perspective of prospective students

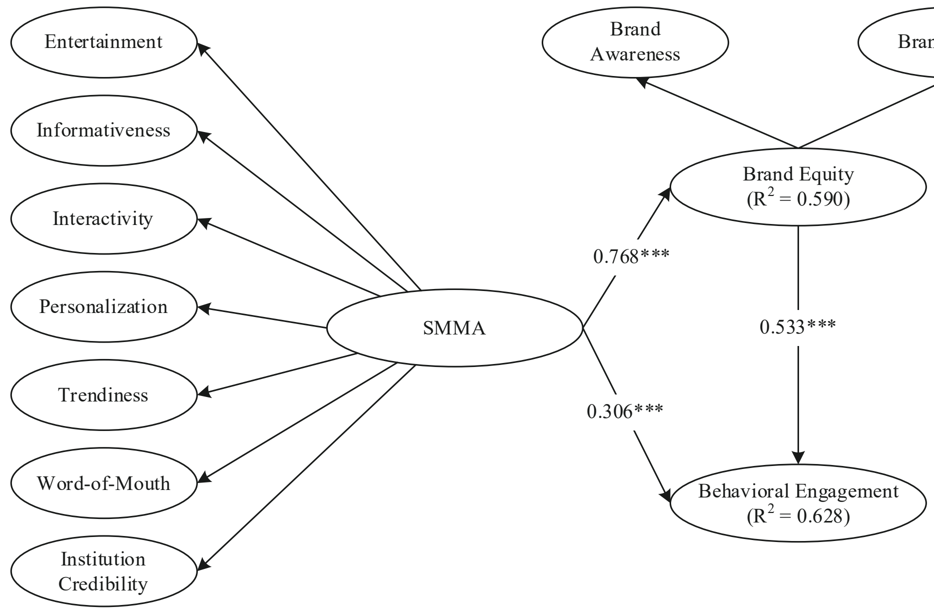

FIGURE 2
Standardized path coefficients and significance of inner model. ***p < 0.001.

TABLE 9 Mediation test result.

Total effect of SMMA → BVE		**Direct effect of SMMA → BVE**		**Indirect effect of SMMA → BVE**		
β	***t*-value**	**β**	***t*-value**		**β**	***t*-value**
0.715***	21.858	0.306***	5.098	SMMA → BE → BVE	0.409***	8.284

BE, brand equity; SMMA, social media marketing activities; BE, behavioral engagement. ***p < 0.001. Number of bootstrap samples = 10,000.

for higher education, behavioral engagement denotes to their propensity to interact with an organization's services or activities and feel connected, which is initiated by either the consumer or the organization. This eagerness stems from a desire to learn more about their future educational institution.

Fourth, the mediation test result shows that brand equity could be a strong factor in the link between SMMA and behavioral engagement. The direct effect path coefficient of SMMA and behavioral engagement is weak. While the path coefficient of its total effect is strong. Supported by significant indirect effect of SMMA to behavioral engagement, this result indicates that the relationship between SMMA and behavioral engagement is strong, but this strong relationship is transmitted through a mediator, which is brand equity. Thus, brand image and brand awareness, as dimensions of brand equity, play an essential mediating role in SMMA and behavioral engagement.

Finally, this is the first research to examine the influence of social media marketing on brand equity and, as a result, essential consumer behavioral engagement in the perspective of higher education. By using the novel data type, this study contributes to the area of research in a variety of ways.

Managerial implication

The research findings shed light on how higher education social media managers should manage their social media to generate the most beneficial impact for the institution, which is getting more new students. Higher education suggested investing more resources in managing social media since this is the most effective tool for communicating its competitive advantage. Moreover, since the audience is Generation Z, reaching them through social media is promising.

Based on the test result, all the dimensions of SMMA need to be involved to create a big picture of higher education's social media activities. It gives higher education social media managers ideas and direction (as a pillar) on how to manage, organize, and arrange their social media posts and content. Since it has become more effective in creating customer engagement (Lou et al., 2019), the soft-selling approach has become the foundation for implementing the SMMA dimension in creating posts and content, even having to post stuff that has nothing to do with the brand (Dessart, 2017). But, in order to foster the customer's knowledge, a hard-selling approach is needed at some points (Northcott et al., 2021). All this effort is meant to create valuable content and posts. Not only blasting out consumers with things that the organization wants, but the organization must also be able to accommodate what customers want to see. Furthermore, the SMMA dimension as the basis for the idea of creating content and posts does not have to rigidly refer to only one dimension. It may be that a single post or piece of content contains more than one characteristic or dimension. For example, a post or content may be entertaining, informative, and interactive. Aside from that, the SMMA dimension could be applied to a variety of posts and content, including photos, tweets, videos, infographics, blogs, articles, and so on, and could be shared across social media platforms.

Hypothesis 1 demonstrates that these sets of SMMA positively influence brand equity. Prospective students increasingly depend on social media to help them make college decisions. As a result, having a solid social media strategy is critical. By applying the SMMA concept, it is able to draw out what distinguishes a university from others and give prospective students a better idea of their brand and its offerings. Higher education can enhance brand awareness on social media at a comparatively low cost. However, higher education awareness will not increase overnight. But, with persistence, consistency, and the use of the aforementioned SMMA strategies, higher education will be well on its way to establishing a brand that is instantly recognizable by potential students. Moreover, prospective students create an impression of higher education based on the current perception of higher education in the market. By using the SMMA strategy, social media can create a brand image for higher education and build trust among potential students.

Hypothesis 2 gives evidence that the SMMA has a positive influence on prospective student behavioral engagement. Which means, prospective students will be looking to a school's social media pages for important updates and to get a better impression of what life on their campus is like. This research suggests the higher education social media manager should create engaging content and posts. The concept of SMMA gives guidance on how to create engaging content.

Hypothesis 3 states that brand equity, with its dimensions (brand awareness and brand image), has a significant impact on prospective student behavioral engagement. Prospective students are eager to learn more about higher education when they recognize it and perceive it to have a positive image. Moreover, SMMA influences prospective students' behavioral engagement through brand equity. According to this finding, higher education may use social media to increase interactions with prospective students, but they need to rely on more established techniques (such as institution image and environment) to persuade them to engage with them. Lastly, this study's mediation test was statistically relevant. The theoretical analysis based on the results shows that brand equity plays an important mediating role in SMMA and behavioral engagement. These results show the higher education social media manager that when arranging or creating social media content, they need to think about what topics will not only get prospective students' attention but also improve the university's image. Social media managers should not be careless about what they post on social media, especially in higher education's social media account context. For example, although this research allows posting funny entertainment content, it must also pay attention to aspects of authority, formality, and norms that are very closely related to a university, and not post any unpolite memes that will actually degrade the image of the higher education.

Research limitations and future study

As Gen Z gets old enough to go to college, it has never been more important for colleges and universities to have a presence on social media. This research looks at the expanding role of social media in higher education and explores how higher education can use social tools to build their institutional reputation and foster a sense of engagement among their prospective students. Based on the results, prospective students increasingly depend on social media to help them make college decisions. Yet, just blasting out recruiting materials on higher education social feeds every day or doing the same type of content every week is not working. By adding the SMMA dimension, they can help higher education improve their brand awareness and image among potential students. As a result, by recognizing higher education and perceiving a good institution image, prospective students are willing to engage with it and make their behavioral engagement as an element of their decision-making process in choosing a college. Despite efforts to create a complete conceptual model and evaluate fresh data, a number of defects may be found in future research. First, comparing the results of prospective students' and current students' is interesting since both are the audience of higher education social media. The different purposes of their intention to engage may vary, driving different results as well. Second, future research needs to consider more customer behavioral aspects as a result of SMMA, specifically in the higher education circumstances. Given the importance of word-of-mouth in the process of new student recruiting, it is very interesting to figure out how to shape prospective students' (or current students') behaviors at the highest level of engagement so that they can voluntarily, actively, and interactively help develop the college brand. Third, we conducted a qualitative study to discover why entertaining, informative, interactive, personalized, trendiness, word-of-mouth oriented, and perceived institutional credibility-oriented posts or content are needed and beneficial from a customer's perspective, specifically. Fourth, as measures of brand equity, this study used brand awareness and brand image. Upcoming research should integrate other factors such as brand quality and brand associations, as well as reconsider the process of establishing brand equity. Finally, this study's generalizability extends beyond the higher education sector. While the findings are likely to be valuable in higher education, they may not be immediately transferrable to other businesses. The results' generality must be validated in different circumstances.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

AR, OS, AW, and S-CC: conceptualization and writing—original draft, review, and editing. AW: formal analysis, investigation, and visualization. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Cats in Palace Museum: A narrative of cultural heritage and empathy of youth

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While research in heritage tourism tends to focus on cultural and anthropogenic motivations and drivers, this paper seeks to examine how social-media narration amidst a broader backdrop context in Chinese mass culture creates, perpetuates, and reinforce feline-focused narratives and practices among social media young followers. Drawing on text and image-based analyses of postings of cat sightings within the official Palace Museum account on a key Chinese microblog, this study reveals the application of three vital narrative strategies at work and corresponding empathic responses: ambassadorial, bounded, and broadcast. The Palace Museum has achieved an enhancement of interaction and emotional exchange between the heritage of Palace Museum and youths and generated a process from attention to emotional engagement and eventually to emotional identification on the part of youths in their attitude toward the heritage of Palace Museum through the workings of three key narrative strategies on Chinese social media. In doing so, this research illuminates the potential of social media-based narratives and charismatic animals in the revitalization of cultural heritage sites and the contributions of setting narrative strategies in engaging the younger audiences while also revitalizing the cultural heritage of the Palace Museum.

KEYWORDS

cultural heritage, cats in palace museum, narrative empathy, youths, text analyses

Introduction

The Imperial Palace of China, formerly called Forbidden City, is the imperial palace of the Ming and Qing Dynasties. It was listed as a "World Cultural Heritage" site in 1987 by UNESCO and is now commonly known as the "Palace Museum." The World Heritage Organization describes the Palace Museum as follows: "The Forbidden City had been the center of the highest authority in China for over five centuries. With an architectural complex including garden landscape and 9,000 rooms of furniture and handcrafts, it is a priceless historical testimony to the Chinese civilization of Ming and Qing Dynasties." However, since the founding of the Palace Museum in 1925, due to incidents of fire and theft, many national treasure objects with high historical and cultural exhibition value had to be mothballed in storerooms for their protection. Yet, it is noteworthy that since Mr. Shan Jixiang became the sixth curator and "gatekeeper" of Palace Museum in 2012, the official stance on the heritage of Palace Museum began to change its formerly detached and aloof style and assume a "populist common touch." The Palace Museum has adopted a cultural, story-based, and interactive approaches *via* its Sina Microblog and WeChat accounts to promote the culture of the Palace Museum outside of its palace walls to enter into the sight of common people. Further, it endeavored to promote a comprehensive, rejuvenating transition of the Palace Museum, by representing and advertising the Palace Museum in new ways favorable and receptive to the youth.

The rejuvenating transition of the Palace Museum was a resounding success and led to an exponential growth in visitor volume. In 2018 (4 years after the commencement of tourism rejuvenation in 2014), the Palace Museum had become the most visited museum in the world and broke their own annual visitorship record with a staggering 17 m visitations. In the same year, the Palace Museum had also broadened its reach to the general population by expanding its online content to nine different kinds of mobile applications covering a variety of contents from official news, games, and visitor guides. It further cemented its online popularity by integrating its official website with commonly used Chinese applications such as Weibo (China's equivalent of Facebook) and Weixin (China's equivalent of WeChat), and put forward a series of new measures to attract younger tourists. These targeted measures proved effective as millennials now comprise the majority of visitors and 40% of visitors are below 30 years old. In the process, the rejuvenation policy succeeds in attracting new groups of younger visitors. Attracting a younger group of domestic tourists is vital to the museum's long-term sustainability as an attractive tourist attraction.

Especially in today's China, with a new media environment as represented by microblog and WeChat, not only does the subject of narration demonstrate a pattern of "decentralization," but also previous narrative strategies and narrative methods of stories depending on traditional media have also changed substantially. The emergence of the Internet and new media platforms has provided new spaces and measures for the dissemination of the heritage. Palace Museum had adopted hundreds of stray cats with an original purpose of eliminating mice for the protection of architecture. But the Palace Museum managed successfully to attract attention and participation from youth visitors by means that appeal to young people, e.g., telling cat stories *via* microblog as an online socializing platform; in the meantime, attraction online drove the tourists' visits offline and directly triggered a mass fervor to the Palace Museum to see the cats among the youth. Many young people have indicated on social media that their primary purpose of visiting the Palace Museum was to see the cats there. In fact, the operations of empathic narrative strategies stimulate and even sustain the tourist attraction on the narrator's object (i.e., Palace Museum).

To understand the increased interest in the palace cats and the palace museum, we turn to theories of empathy. However, although the concepts and theories of narrative and empathy in a cross-disciplinary view are well recognized in the field of tourism studies, not only have "how to narrate" and "how to engender empathy" not been effectively applied to the research of heritage protection and utilization, but the idea correlation and functioning between narrative and empathy also have not been sufficiently discussed or explored. By setting a narrative empathy analysis, we examine the interplay between creation and consumption of narrative strategies between producers and consumers and seek to fill this scholarly gap by drawing upon theories of narrative and empathy from an interdisciplinary perspective, to study the stories of the adopted cats in the Palace Museum on Chinese social media.

Therefore, this research adopts the theories of narrative and empathy from an interdisciplinary perspective, targets the stories of cats in the Palace Museum appearing on the microblog social media as the object of case analysis, and discusses with what narrative strategies the narrator used to tell the stories of cats in Palace Museum, and how the cats' stories and their dissemination have produced an empathic effect on Palace Museum in the mind of youths. Answering the questions above effectively will have an innovative theoretic significance and an instructive practical value for the research of the dissemination, inheritance, vitalization, and utilization of relics of cultural relic sites.

Literature review

Tourism and narrative

Narrative originated from literature and linguistics and later entered the domain of geography as a means. The role of narratives in understanding society and societal change is a vital one (Cameron, 2012; Lu, 2013), and various scholars have highlighted the need to connect story and narrative concepts with place and its cultural connotations and discuss their narrative strategies, dissemination methods, and constructive meanings (Blunt and Rose, 1994; Lorimer, 2008). Research on narratives in the field of tourism studies lies in tourism marketing (Stokowski, 2002; Lichrou et al., 2008; Chronis, 2012). For example, Lichrou et al. (2008) maintains that tourism is not simply about places, but is about the experience of a place, about meeting people, and the interactions between hosts and visitors and those with fellow tourists. Narrative is a means through which places are constructed (Stokowski, 2002). Narrative relates to the marketing of place to the consumption experience (Lichrou et al., 2008). Tourist spots with stories can not only present a quality aesthetic experience of the mystery of the tourist destinations and make the cultural connotations and context of the tourist spots easy to understand and perceive, but storytelling can also allow places to be salient destinations and change the attitudes of consumers toward these attractions and entice them to visit (Chronis, 2012); Moreover, from the perspective of consumers' feelings, research of influences of narrative on the experience and consumption of tourists and humorous storytelling in product advertising can evoke emotional responses to form brand attitude and image (Rhie, 2014), and a good story can stimulate consumers' interests (Escalas, 1997). It can also create emotional connections between consumers and destinations (Jones et al., 2016), and even transform a place into a high-quality and identifiable tourist spot with aesthetic significance, further change consumers' attitudes towards a destination and entice them to visit (Wong et al., 2015).

Although the research in the field of tourism have strongly affirmed the positive values of narrative on the tourist industry, so far they have mainly focused on the experience of tourists and the marketing effects of the destinations and touched less on topics such as narrative strategies and methods of narrators. Meanwhile, although there are a few scholars who have stressed that stories have an important value for the formation of cultural identification with the heritage sites from the perspective of urban heritage designers and suggested that shaping a heritage site with a sense of cultural identification requires the tangible material factors to be handled well, as well as addressing the question between the site and its historical stories. These are both essential and indispensable to constructing cultural identification (Frenchman, 2011). Through the weaving a narrative, cultural emotions in the places can be evoked, characteristics and connotations embedded in the places can be interpreted (Lorimer, 2003), generating productivity and participation (Gibson-Graham, 2008). And there is a growing realization that heritage is a process of cultural production, and that the disciplines involved in heritage research and practices are involved themselves in the making of heritage (Smith, 2011). However, research and discussions on introducing narrative theories from a cross-disciplinary perspective and applying them to the protection and utilization of cultural heritages have remained sparse to this day.

Tourism and empathy

Empathy, a vicarious and spontaneous sharing of affections, can be provoked by witnessing another's emotional state, by hearing about another's conditions, or even by reading (Keen, 2006). While Hollan and Throop (2011) and Tucker (2016) position empathy as the sharing of another person's perspective and unlike other "altruistic emotions" such as sympathy, empathy has an added dimension of "identification with the other (person)." Given the human relational aspects of tourism, empathy inevitably plays a covert role in the construction of experiences in all contexts. Adaval et al. (2007) remind us that empathy is a decisive influence over individuals' attitudes and behaviors when engaging in tourism activities. Empathy, as a social science concept has long been explored alongside tourism studies in areas including but not exclusive to tourists' experience (Adaval et al., 2007; Andermann and Arnold-de Simine, 2012), volunteer tourism (Pedwell, 2012; Butcher, 2014), tour guiding and interpretation at museums and heritage sites(Dimache et al., 2017), 'dark tourism' (Miles, 2002; Stone, 2006), tourism and the environment, tourists' ethics and behavior (Norridge, 2009), tourism and hospitality (Barlow and Maul, 2000), and so on. Of particular interest is the idea of "historical or heritage empathy." Visitors experience being concerned for people in the past and how they experienced their lives (Barton and Levstik, 2004) and tourists on these tours are encouraged to "adopt cognitively a perspective different from their own and to establish an emotional connection with historical actors from different eras and walks of life" (Modlin et al., 2011). Selected researchers in "dark tourism" also discovered that visitations to macabre sites where actual death and suffering took place (e.g., Auschwitz) evoke a stronger empathic response from visitors more so than museums of the same theme (Miles, 2002; Stone, 2006).

To date, tourism studies have mostly focused on the "results" of empathy, i.e., positive effects of the tourists' empathetic responses on their experience of touring destinations; of particular interest is the experience of being there among "others" (Tucker, 2016). However, there is a noticeable literature gap in the study of the connection of empathy to heritage narration in tourism studies (i.e., what causes empathy, how empathy is processed and what strategies are used to evoke empathy), especially narrative empathy. Although stressing the formation of historical empathy in the research of historical and cultural heritages is conducive to the evocation of the emotional resonations of tourists, research that focuses on the means and methods to evoke tourists' empathetic emotions have been insufficient.

Gallagher (2012) suggests that "narrative" is a fundamental mechanism of means in the arousing of "empathy" in individuals. Nevertheless, the application of the two has been separated and there was little research on integrating "narrative" and "empathy" to present them together. For example, how do the narrators' narratives of destinations trigger the empathetic responses from tourists or potential tourists? There was especially minimal progress in the research with youth as the main target of research that could be applied to the utilization and vitalization of cultural heritages.

Research method

Theoretical framework

This study adopts the narrative empathy theory (Keen, 2006) as its theoretic framework. As a cross-disciplinary theory, the narrative empathy theory involves multiple domains, such as literary narrative, cognitive narrative, theory of reader response, marketing, and contemporary neuroscience. It refers to the emotional resonation (integration) of readers with text and characters in the story, including alternative situation in reading, checking, listening, or imagining stories and condition-induced shared sentiments and empathetic understanding (Zhong, 2017). The narrative empathy theory mainly focuses on the two aspects of "narrative" and "empathy." Its concerned targets are the psychology and emotion of authors or readers, and its purpose is to reveal how various narrative techniques evoke empathetic responses from readers. As narrative mainly includes three factors, i.e., narrator, audience, and narrative's object. On the online platforms, the storyteller(s) of these "cat stories" on the Palace Museum's official online platforms play(s) the role of the "narrator," with the palace cats often forming its central objects of interest, set within photogenic backdrops of imperial Chinese heritage, and the followers of this official account are the "audience." We seek to add theoretically to the understandings of the operations of empathic narrative strategies by unpacking the entanglement between these three elements.

The specific theoretic framework of this study consists in the three strategic narrative empathies (Keen, 2006), which are bounded strategic empathy, ambassadorial strategic empathy, and broadcast strategic empathy. Keen (2006) maintains that all three strategic narrative empathies are narrative strategies and techniques adopted by creators/publishers to influence or even manipulate the emotions, attitude, and behavior of targeted audiences. In other words, most authors attempt to evoke attention, empathy, and identification in readers to realize certain purposes. Thus, this also corresponds to the question to be answered by this study, which asks, how has the Palace Museum managed to build an active interactive relationship between people and cultural heritage sites and evoke an empathetic response from the audience through the cat stories? Here, we will build on the narrative empathy theory to examine how adopted palace cats and social media come together to shape and reshape tourism at the Palace Museum, an official and formal cultural heritage site.

Methodology

In terms of research method, this study mainly adopts a method that combines quantitative narrative analysis and qualitative narrative analysis. As a means of sociological research, narrative analysis effectively integrates a variety of single or synthesized research, such as definition questions, descriptive questions, process questions, oral interactions, dialogue questions, and behavioral questions (Wang, 2013). Most narrative or story studies, particularly in narrative transportation experiments, exclusively focus on traditional written texts (Van Laer et al., 2014). However, narrative is ubiquitous in the sense that narrative in the form of text can include words, pictures, music, novels, and advertisements, and the audience of stories can be a reader, spectator, listener, and even a tourist.

This study purposefully selected "*Gugong Baidianer*" (*Palace Museum White Dot*), as our site of analysis. *Baidianer* (hereainfter White Dot) was the name of a cute and furry (deceased) cat in the museum. However, many other furry cats, such as Aobai, Xiangcai, Xiaoliu, and Changtui are also featured on the microblog. This account has a large audience with more than 110,000 active followers. Since material in this microblog is mainly presented through a combination of text and pictures, we utilized two methods to analyze the content for our study purposes. All the text-based and photographic material quoted and referenced in this paper are from this official microblog unless otherwise stated.

Firstly, this study used the octopus web crawler software to collect the text contents of 176 entries posted between June 30, 2018, and April 12, 2019, and obtained a collated sample document to be used for the acquisition of high-frequency words in the microblog.

Secondly, pictorial analysis was used to conduct a narrative analysis of the pictorial texts, through analyzing the respective proportions of elements of the Palace Museum and the cat elements in the pictures vis-à-vis the total size of the pictures, to reveal the unique identity construction of the cats and their followers in the curated pictures. The selection of pictures was done through random sampling ($n = 452$) of pictures published before April 12, 2019, in the photo album aptly named, "White Dot of Palace Museum." We followed three criteria in our selection: individualized; clear and easily identifiable, and no duplicate pictures. After applying these three criteria, we obtained 442 qualified pictures from which a further 100 pictures are selected randomly as samples for analysis. In the proportional analysis of pictorial elements, we adopted method of Lu and Song (2016) of analyzing the composition of pictorial elements in the classic garden landscape plane graph and used AUTOCAD 2019 to mark out the elements in the sample pictures and calculated the areas and proportions of the composing elements in all the 100 pictures, respectively.

Study findings

Ambassadorial strategic empathy: Evoking attention of audiences with construction of the "special identity" of cats

Narrators who utilize ambassadorial strategic empathy first attract the attention of readers and subsequently cultivate and sustain readers' interest through playing up the uniqueness of the narrated object of interest (Keen, 2006). In our study, firstly, narration alongside curated pictures of the palace felines reinforces the identity of the royal cats by highlighting distinctive elements of the Palace Museum; these curated pictures possess sharp visual perceptibility and strong aesthetic characters. Secondly, text narrative as caption of the pictures has not only a flavor of the imperial court, but also a strong characteristic of personification. This narrative strategy has intensified the construction of the special identity of the cats and speaks to the readers. These cats are no ordinary cats but court cats living in the imperial palace. They are unique and nowhere else to be found. The narrator of stories of the cats in the Palace Museum adopts a method of combining pictures and text and publishes cat stories through the microblog account. According to the theory of Narratology, relating and representing scenes of cat life in the Palace Museum is a narrative in nature. Therefore, this study first conducts a qualitative narrative analysis of the pictures and text of the microblog account, "White Dot of Palace Museum."

Analysis of pictorial narrative factors: Highlighting elements of palace museum under the theme of cats

To reveal the reasons behind the attention paid by youths to the cats in the Palace Museum, we marked the various elements in the 100 samples with AUTOCAD software, calculated a proportion of each pictorial element in each picture, and obtained the average area of each pictorial element. The results are shown in Table 1.

It can be seen from Table 1 that the various elements in the Palace Museum such as the palace's distinctive, red-themed architecture such as doors and windows, flowers, and trees et al. occupy a significant area in the pictures, and their combined total proportion far exceeds the cats. As distinctive cultural symbols representing architecture of the Palace Museum, such as the red wall and red gate, etc., are consciously highlighted. Lively cats shuttle in the space amid historical architectures, with the dynamic animal and static architecture complementing each other in representation. The depictions of the daily life state of the cats in the pictures have in effect shortened the distance between the architecture in the Palace Museum and in real life, while the distinctive background symbols in the Palace Museum have unnoticeably constructed the special aesthetic effect of the palace cats.

The micro-blogger, i.e., the recorder and narrator of the life of the cats in the Palace Museum, has masterly integrated elements of the cats with that of the Palace Museum through the composition design of photographing, which not only enabled a strong aesthetic connection visually between the cats and the Palace Museum, but also in the meantime conferred on the cats an extremely strong specific identity of "cats of Palace Museum". The specificity of the composition and narrative of these pictures and the aesthetic sense they engender have evoked the empathetic response from readers, and the empathetic effects are mainly demonstrated as follows: first, the story readers change their degree of involvement from looking at, to caring about, and choose to become fans of the microblog account "White Dot of Palace Museum" with comments such as "having become follower of the White Dot account," "the 36th fan of the White Dot is here to report," "seeing the stories of the cats of Palace Museum, I became a follower right away," etc.; second, after receiving the information on the identity of the cats implied in the pictures, readers show their affection and appreciation of the cats by emphasizing the specific identity of "Palace cats" in terms of cognitive and emotional expressions with comments such as, "all cats in the Palace Museum are so cute," "cats of the Palace really look pretty," and "cats certainly match better with Palace Museum"; finally, having gained such an aesthetic experience through the pictures and stories of "Cats and Palace Museum," readers tend to shift their acknowledgement and praise from the stories to the narrator of the stories, which incurs a "from-animal-to-human" empathetic effect, exemplified by comments such as, "what a lovely photographer that could produce such photos!" and "falling in love with the photographer of Palace Museum."

TABLE 1 Average proportions of composing elements in the 100 pictures.

Elements	Cats	Palace Museum				Others
Content	Cats	Red/white wall (8.01%)	Red window (4.05%)	Roof and tile (3.26%)	Floor (30.66%)	Sky, flying birds, and bicycles
		Flower, grass and tree (7.32%)	Red gate (1.84%)	Other elements of Palace Museum (Long chairs, antiques, rockery, columns, etc.) (3.20%)		
Average proportions in the pictures	22.49%	58.34%				19.17%

An analysis of word frequencies of the caption texts: Aulic tendency and personification of cats

We also analyzed the content of the texts by using the analytical functions of social networking and the semantic network of RostCM6 software. Words appearing more than 10 times were selected. Those considered meaningless or irrelevant to the cats in Palace Museum were excluded. The results are shown in Table 2.

After analyzing the word frequencies, it was discovered that "Palace Museum" and "White Dot" have the highest frequencies, and the former slightly more frequently than the name of the cat. This demonstrates that the narrator has used the linguistic symbol, "Palace Museum" frequently in his/her literal narrative. In other words, in the storytelling of "cats" and "Palace Museum," the portrayal of the character of the cat "White Dot" as the protagonist has always been placed in the historical space and time of the Palace Museum; second, viewed from the part of speech, the frequently appearing words in the tales of the microblog account, "White Dot of Palace Museum" are mainly nouns and mostly appellations, such as "empress dowager," "master," "princess," "younger sister," "elder brother," etc., and especially many appellations that match the historical scenes of the Palace Museum like "empress dowager," "master," and "princess," which not only personifies the cats, but in the meantime also connect the cats with the historical scenes and culture of the Palace Museum. Moreover, these historical appellations have not only made the image of the animals interesting, but also put readers in the historical scenes of the Palace Museum.

The key for the occurrence of narrative empathy consists in the choice of perspectives on the basis of space. As a result, readers have produced two kinds of empathetic responses. One is that the readers shift from the current space and time to the historical space and time, personify cats to imply human nature, and adopt utterances of the imperial court to interact with the cat stories.

TABLE 2 List of high-frequency words and the word frequencies in the microblog text.

Serial number	Keywords	Word frequencies	Serial number	Keywords	Word frequencies
1	Palace Museum	71	22	Elder brother	16
2	White Dot	69	23	Wander	15
3	Coriander	42	24	Uncle	15
4	Friend	38	25	Mom	14
5	Elder sister	34	26	Hospital	14
6	Beijing	30	27	Ci Ning Palace	14
7	Pussy	27	28	Look after	13
8	Black Tail	25	29	Photographer	12
9	Copycat	25	30	Master	12
10	Doctor	24	31	Pet	12
11	Adoption	23	32	Kitten	12
12	Story	23	33	Name	12
13	Museum	23	34	Thank	11
14	Colleague	22	35	Thirty	11
15	In the yard	21	36	Surgery	11
16	Younger sister	20	37	Question	10
17	Empress dowager	19	38	Time	10
18	Sterilize	18	39	Audience	10
19	Three-Colored	18	40	Child	10
20	Tin can	18	41	Princess	10
21	Baby	17			

Examples of this include comments such as, “wish your majesty (meaning the cat) eternal health and felicity,” “I (meaning the cat) sit up in the palace,” and “blessings to the empress dowager.” The other response is that readers cosplay the figures of the imperial palace in history through the cats. This reinforces the representation of historical scenes in the imperial palace and the imagination of historical figures in the cats’ tones, such as “Aobai (name of a cat) said: ‘quite a few people are coming to court lately,’” “This is Aobai, present yourselves before me!,” and “Aobai (name of a cat) said: ‘I cannot bow my head, because My crown might fall off.’”

Bounded strategic empathy: Evoking the emotional engagement of audience from multi-narrative perspective

Keen (2006) points out that Bounded Strategic Empathy mainly targets members of a group and galvanizes readers into producing certain emotions toward those with whom they are familiar based on common experiences. This particular narrative strategy is characterized by telling stories with features of similarity to or familiarity with readers in terms of the story content to pull the readers closer to the stories. The generation of responses to Bounded Strategic Empathy usually requires a comprehensive application of multi-narrative perspective, and seeks to apply a variety of narrative perspectives in the storytelling technique to enter the inner world of different readers and enhance their emotional engagement.

Narrative strategy of internal perspective: Evoking the empathetic response “from animal to human”

Keen (2006) believes that the internal perspective mainly consists of three types, namely narrated monologue, interior monologue, and psychonarration. In the microblog stories of the cats in the Palace Museum, the narrator conducts a fully illustrated representation of the characters and images of the cat. The texts usually adopt a narrative strategy of an internal perspective, and use a first person “I” to depict the mental activities of the cats. The first person narration and the psychological description in representation of the characters’ consciousness and emotions can help readers identify with the characters and facilitate the evocation of empathetic experience (Keen, 2006).

In Type 1 illustrated narrative of “narrated monologue,” the author takes a picture of a cat sleeping in the Palace Museum and accompanies it with descriptive text. The life of the cat recorded tallies with the pace of life of human beings, and readers can discover a sense of familiarity and common ground in the life and mental state of the cat. In type 2 illustrated narrative of “interior monologue,” the author captures changes in the movement and manner of the cat and uses apposite words to directly demonstrate the interior monologue of the cat from being commanding to meek and then to helpless. The three pictures and their captions render a delicate and vivid portrayal of the cat’s character and present the mental activity of the cat as a fluid, fickle, and corresponsive process, which facilitates the understanding and adds more enjoyment on the part of the readers. In type 3 illustrated narrative of “psychonarration,” the author demonstrates a story of dialogue between different cats with text, which enriches the originally monotonous life of cats, projects the course of human interaction on the life of the cats, and renders a sense of intimacy to the readers.

Through the narrative strategy of internal perspective, the story narration will possess a strong sense of empathy and authenticity. After reading the stories successively, readers develop a sense of familiarity with the cats, and also forge an emotional relationship between themselves (as cat observers) and the cats. The readers thus have progressed gradually from initial observation to participation and voluntarily increased their emotional engagement by immersing themselves in the world of cat stories, which begets the effect of immersion, which are demonstrated by the readers' comments such as "*Miss you, White Dot,*" "*Thinking about the White Dot everyday,*" "*Waiting for the renewal of the microblog stories everyday,*" "*Paying attention to the White Dot everyday,*" "*Really missing the White Dot and expecting to hear your stories about the cats in Palace Museum,*" etc. Meanwhile, empathetic responses generated by this narrative strategy are mainly shown as being an "animal-to-human" process: Firstly, readers associate cats with themselves, project the living conditions of the cats on their own state of life, and express their longing for the free-living cats, exemplified by comments such as, "*How I wish myself being a cat and lying there quietly and leisurely, without having anything, good or bad, to worry about. Being free is all I want,*" etc. Secondly, readers associate the cat with the staffs of the Palace Museum, and through the cats, emotions of respecting and praising those who take care of it are evoked, as manifested in comments such as "*In fact, I am most grateful to you guys (staffs of Palace Museum). As a national cultural unit, you are now a protector of stray cats, which not only sets up a shining example for others, but also helps foster a good idea among the public that humans and animals can always live in harmony with each other,*" "*I believe that as a fine model of loving cats, staffs of Palace Museum can play a huge role on protecting poor stray animals and creating a harmonious cultural environment. Thank you for your effort,*" etc. Lastly, readers associate the cats with human beings in general and a reflection on human ethics and emotions is evoked through the character and qualities of the cat in the stories, which are displayed by comments such as, "*Perhaps on White Dot, sometimes we can find what we humans lack, like the desire to share all the happiness with others, such a sincerity and selflessness,*" "*Being a human or a cat, one needs to be the simple and honest kind, to be respected by others,*" and "*We humans really need to have a loving heart.*"

Narrative strategy of external perspective: Evoking the empathetic response "from animal to place"

"Internal perspective" and "external perspective" are opposite outlooks of each other. The difference between the two consists in whether the observing position of the story narrator is "inside" or "outside" the "story" (Zeng, 2005). External perspective is in fact a knowledge-limited perspective, which can be demonstrated by the formula "narrator<figure" of Genette (1990). Due to the limitations of the observing angle of the narrator, readers can only see the behavior of the figure in action from the perspective of the narrator but have no idea of the emotion and mental activities of the figure; while the external perspective can also directly guide readers to form a value concept over certain events through outlining the background of the story (Jiang and Zhang, 2018). The narrative strategy of external perspective narrates cat stories from the third-person narrative perspective, maintains the position of an observer and does not interfere with the mental activities of cats. Such a perspective can trigger more space of imagination and judgment of readers over stories and cats as the protagonist of the stories. In the examples, such as "*Next time when touring Palace Museum, I shall be as curious as a cat, opening my cat's eyes wide and erecting my cat's ears, to observe and feel about this city with my heart.*" Another narrator makes an objective recording of the life of the palace cats, by commenting: "*This weekend at the Ci Ning Palace (one of the palaces in Palace Museum), you cannot entice Coriander (name of a cat) even with dried fish. She has just received a de-worming vaccination shot and is being kept for monitoring. You guys may want to take more look at the deer in the garden of Ci Ning Palace and the fish at Linxi Pavilion, both having a long history.*" In this comment, the narrator does not speculate or depict the mental activities of the cats, yet the scene of Palace Museum has never been absent, always fostering a sense of specific locality with information of spots such as "Beijing," "this city," "Ci Ning Palace," and "Linxi Pavilion," which has evoked the imagination of readers over the heritage of Palace Museum and its environment and, through indirect information introduction and impartment, enabled readers to obtain a perception of the geography and environment of the Palace Museum in a subtle and subconscious fashion and gradually created a sense of familiarity between the people and the place.

Through the narrative strategy of external perspective, the narrator attaches a sense of openness and productivity to the cat stories, and readers beget a "from animal to place" empathetic effect under the open narrative approach. Firstly, readers associate cats with Palace Museum and develop an interest in its history and culture, reflected by comments such as "*Thanks to White Dot for making me experience a different Palace Museum,*" and "*One day I shall go to Beijing, to look at the city that has shouldered so much history and look at the red walls and green tiles of Palace Museum.*" Secondly, readers rediscover the value of Palace Museum through cats and engender a warm and tender aesthetic appreciation of the image of Palace Museum, expressed by comments such as, "*Neither can Palace Museum live without these cats, nor can the cats live without Palace Museum,*" "*There is kindness and warmth in the Palace Museum,*" and "*Palace Museum is not just a museum but also a place full of humanistic care and love,*" Lastly, from their positive perception of Palace Museum, readers cultivate spatially a sense of identification with Beijing where Palace Museum is located and the Chinese civilization at large, as demonstrated by comments such as "*Because of the Palace cats, I came to feel that Palace Museum is no longer just about icy cold architecture and relics but a warm and lively place with flesh and blood. Even Beijing has gained some warmth from them,*" and "*The greatness of Palace Museum not only lies in its historical deposits, but all the more lies in its compassion and love for living creatures. May the love be carried on and extended beyond the walls of Palace Museum.*"

Broadcast strategic empathy: Creating audience's identification through common life narrative

Keen (2006) points out that broadcast strategic empathy appeals to every reader to emotionally identify with the object of the narrative by stressing common human experiences, emotions, hopes, and fragilities. Broadcast strategic empathy is mainly characterized by narrating stories based on emphasis of human commonality and intercommunity and does not merely present details or relay facts, but also to evoke identification of readers. Under such narrative strategy, readers come to form an understanding of and identification with the cats through caring about and participating in the life experiences of the cats in the stories and gradually develop an emotional identification with the staffs and the cultural heritage of Palace Museum.

Topics of broadcast narrative and expressions of audience identification

It was discovered through the research that while cats are the protagonist in the microblog stories, the narrator does not portray the cats or depict their characters elaborately, and the identification of readers with the cats only comes from tiny elements in the stories involving the identity, status, and feelings of the cats. In thus, we selected 15 high-profile stories with three criteria, namely 150 words or more in story length, more than 1,000 likes, and more than 100 comments from the microblog as our objects of analysis. This then formed the basis to produce human themes as shown in (Table 3) the statistical results below:

Meanwhile, it was also discovered, through counting the feedback information on the stories from readers in the comment section of the 15 stories that firstly, the numbers of likes and forwards of each story accounted for more than 70% of the total number of comments. Actions of giving likes and forwarding directly reflect the positive emotion and attitude of readers toward the stories and are typical practices of expressing approval by the readers. Secondly, besides giving likes and forwarding stories, readers also express their emotions through text comments, which mainly consist of three types: encouragement; expectation; and gratitude.

Text comments from readers with "encouragement" as an expression of emotions are mainly composed of two types. One type stresses the "Palace Museum" identity of the cats and identifies with the strong vitality and the resilient character of the cats. Some examples of this includes comments such as, "*White Dot, you must get better! You are a cat of Palace Museum,*" "*Come on White Dot! You are the most adorable cat of the Imperial Palace*," The other uses the "affirmative power of human love" as encouragement for the cats and endorses the emotional bond between cats and humans, such as "*Cheer up White Dot, so many people love you, and life on earth is worth living,*" "*Get better soon, we will see you again in Palace Museum,*" Text comments from readers with "expectation" as an expression of identifications are mainly demonstrated in two aspects: one is the expectation to visit Palace Museum as a result of identifying with the cats, such as, "*Cheer up White Dot, I expect to visit Palace Museum to feed you your favorite canned meat after you recover,*" "*You must get better! We will go to see you at Palace Museum,*"; the other is the action of caring resulting from identification with the cats, such as "*Want to know what Palace cats need lately (brands of cat food, snacks), and to what address shall I write if I want to send stuffs to the Palace cats?*" Text content from readers with "gratitude" as an expression of identifications are mainly demonstrated in two aspects: one is the generation of the feelings of identification with and gratitude to Palace Museum and its staffs through the narrator's detailed descriptions of the cats living in Palace Museum receiving love and care, such as, "*Thank you (staffs and volunteers of Palace Museum) for looking after White Dot*" and "*Thanks to the staffs of Palace Museum for earnestly caring and treating the cats*"; the other is the generation of collective cohesion and the spirit of love among readers from their identification with the practice of Palace Museum and its staffs, such as, "*Please tell me what I can do for it?*" "*We can also dedicate our share of power of love to these cats,*" and "*If there's need, I am willing to dedicate my humble strength to the medical treatment.*"

Empathetic behavior based on emotional identification

Keen maintains that identification (which occurs in readers not texts) is not narrative strategy in itself, but a result of reading, which is probably caused by using a specific strategy, while identification is always likely to evoke empathy (Keen, 2006). Experiencing empathy and imagination may affect the audience's emotions, cognition, and beliefs, which can further influence attitudes, intentions, and behaviors (Adaval et al., 2007). In the context of this study, through practices of bringing the scenes of the Palace Museum where the Palace cats live into the stories and portray life in the Palace Museum, readers' empathy for the "Palace Museum cats" has triggered changes in their cognition of "Palace Museum" and behaviors of visiting it.

Firstly, based on narratives of daily life common to humanity, micro bloggers authentically record the life of cats in Palace Museum and transform Palace Museum from a mysterious, cold, and solemn space of cultural heritage to a human-place interactive space that is touchable, palpable, and has a touch of human feeling and warmth. Not only has the youthful audience expressed their love for and identification with the cats online, their attitudes and emotions toward Palace Museum have changed from a sense of

TABLE 3 Themes in 15 stories.

S/N	Universal human needs/ values	Themes in narrative content	No of Likes and %/total comments
Story 1	Connection (with others)	(Love) Sick cat being helped and cared for by volunteers	9,909; 71%
Story 2		(Friendship) Blossoming friendship between two cats	1,953; 81%
Story 3		(Compassion) A tale of kindness and sincerity of cats and appeal for caring about stray cats	864; 87%
Story 4		(Compassion) Sick cat being helped by kindhearted people	1,018; 81%
Story 5		(Romance) Palace cats who found love with each other	822; 81%
Story 6		(Companionship) Interaction between a Palace cat and tourists	799; 78%
Story 7		(Maternal love) A mother's great love exhibited by a mother cat	621; 74%
Story 8		(Compassion) Adopted cat by museum staff	720; 75%
Story 9	Well-Being	(Shelter) Welcoming a adopted cat to its new cozy home	1,659; 86%
Story 10		(Health) Caring for cats' health through physical examination	1,985; 75%
Story 11		(Safety and security) The prodigal cat who left and returned to the Palace	6,605; 87%
Story 12	Birthing	(New life) Pregnant cat giving birth	1,149; 81%
Story 13	Altruism	(Sacrifice) Adoption of cat by staff after becoming sick	653; 78%
Story 14		(Sacrifice) Seriously ill cat being looked after by a group of volunteers	462; 75%
Story 15	Death	(Passing of life) Death of seriously ill/elderly cats	461; 80%

distance previously to a sense of intimacy to the heritage itself, and assumed a strong voluntary consciousness to disseminate and inherit it, as displayed by comments such as, "*This change (of Palace Museum) is heartwarming, kitties are being taken good care of,*" "*My great Palace Museum is really full of love! This is exactly how humans and animals should live side by side!*" Secondly, the identification and empathy of youths with the cats in Palace Museum have produced a positive influence on the group behavior of youths. The youth group not only regard the cats as a dynamic intermediary for establishing a real interactive relationship with Palace Museum and as an object upon which to place and express positive inner emotions, but also to find expression of such emotions of identification with the Palace cats in their own daily life behaviors and actions. Shan Jixiang, the sixth curator of Palace Museum, remarked that every day, the Palace Museum receives cat food sent from people across the country from the Northeast to the South of China, some of which even stipulate recipients specifically such as the cats of Ci Ning Palace or Yan Xi Palace. Lastly, the interactive process evoked by the intermediary of stories generated a positive influence on the youth visitors regarding their perception of and sentiment about the cultural heritage of Palace Museum. Furthermore, the cats in Palace Museum have also become a special attraction to young people at the site of this cultural heritage, which are demonstrated by comments of many microblog users, such as "*My little daughter at such a young age is pleading me to take her to Palace Museum, all because of the cats,*" "*Where are cats roaming (in Palace Museum)? Think about buying a ticket to go there tomorrow for the specific purpose to play with the cats,*" "*Since becoming a follower of the microblog, I've always longed to get a chance to see those lovely Palace cats,*" and "*For the cats, I'll go to Palace Museum one more time.*"

Discussion

Heritages are in essence a process of cultural production that produces meanings. Meanwhile, different social groups have diversified ways of understanding and utilizing heritages (Smith, 2011). Through our research, Palace Museum creatively interprets its cultural connotations and proactively engages the interest of youthful audiences in an environment of new media communication. The ways of narrating Palace cat stories cater to the characteristics of self-expression and free communication of youth groups and fit in with the aesthetic taste of modern youthful culture. Youth groups have developed an attention to and a fondness of the cultural heritage of Palace Museum through viewing pictures and reading stories of Palace cats on social media such as *via* microblog sites, which demonstrate not only a new way of creating the emotional response of tourists (Jelinčić et al., 2021) between the youth groups and heritage sites in an era of new communication, but also the reinterpretation and meaning production of the value of cultural heritages by youth groups. In the meantime, "Authorized Heritage Discourse" holds that heritages are fragile, limited, and non-renewable, and must be protected by experts, who refer to archaeologists, museum curators, architects etc., who are naturally considered guardians of the past and who can understand the value of heritages and convey it to audiences, both domestic and worldwide. Smith (2011) holds the opposite view and believes that not only are heritages important, dynamic, fluid, and not locked in physical forms, but their visitors are not passive either. As such, visitors to museums are users of the heritages, who strive to understand and utilize the heritage productions in multiple ways. Our research effectively verifies views of Smith, and also complements the views on the dynamics of the heritages themselves and the initiative of visitors to a certain degree.

Driven by the world heritage movement of today, the protection, utilization and research of cultural heritages are being converted from a historical venue controlled by elites top-down, to a space that gives access to common people and plays to the value of the heritage's bottom-up. In essence, heritages are constructed (Zhang, 2008), and constructed by those who are commanders and narrators of the rights of speech (Zhou and Zhang, 2019). The value of cultural heritages is not just locked inside the relics, nor relies on the traditional method of experts' interpretations only for dissemination. Daily life-oriented construction of the heritage sites does not lower the class of the cultural heritages or decrease their value; on the contrary, the process of "disenchantment" in which the heritage sites move to the visual field of popular aesthetics can actually cause the audience to recast their attention to the heritages and to positively interpret and actively disseminate their value. Although the heritage sites as historical places are detached from their historical environment, through employment of the Internet and new media technologies, they can enter the popular vision assisted by multiple methods of narration and dissemination, activate an emotional resonation of contemporary people. To this end, a salient theoretical point we uncovered here is how animals are featured in the promotion and shaping of a cultural heritage tourism experience at a major Chinese historic site. The ways in which the cats are enrolled into the narration of cultural heritage and its tourism practices resonate with contributions in Actor-Network Theory concerning the re-centreing of animals in our social sciences.

Conclusion

In a new environment of mass communication, Palace Museum opens the microblog account, "White Dot of Palace Museum" on the microblog platform and endeavors to create a vivid personified image of cats by truthfully documenting the life of the Palace cats through a combination of picture and text and with multiple narrative strategies and methods, which not only has evoked empathetic responses from readers along the attention-engagement-identification line, but also generated in readers an empathetic effect of "identification with animal (cats) to that of human" and "identification with animal (cats) to that of place (Palace Museum)."

Firstly, the narrator employs ambassadorial narrative strategy as the main method of drawing the attention of audiences. The narrator has highlighted and reinforced the symbol of Palace Museum in both pictorial and text narratives by active construction, created an aesthetic relationship between the cats and Palace Museum, and induced the attention of the audience to the Palace cats successfully through constructing a special "Palace Museum" identity of the cats. Secondly, on the basis of successfully induced attention of the readers, the narrator uses bounded narrative strategy as the main method of stimulating readers to increase their emotional engagement and narrate the life of Palace cats through narratives of internal and external perspectives, respectively. Lastly, the broadcast narrative strategy uses narrations based on the daily life of cats to effectively evoke a sense of identification of the readers with the cats through selecting narrative topics that are commonly shared by humans and cats, in which the cat stories become an intermediary of creating a positive emotional bond between the youthful audience and the heritage site, and the Palace cats become a special attraction to young people at the site of Palace Museum cultural heritage.

Palace Museum uses the narration and dissemination of the cat stories as an effective means of reconstructing the modern value of Palace Museum heritage and uses multiple narrative strategies and methods to create positive empathetic responses and effects among youth groups, which has not only attracted the attention to and participation in Palace Museum and its heritage from youths again, but created an identification of youths with the cultural heritage of the Palace Museum. The narration of stories not only can create special attractors for sites of cultural heritage, but also reconstruct the cultural value of cultural heritages so as to ensure the latter is protected and utilized in the course of dynamic narration and active dissemination.

Given that the focus of our image content analysis is focused on the respective proportion of elements of the Palace Museum and the cat elements in the pictures vis-à-vis the total size of the pictures to reveal the unique identity construction of the cats and their followers in the curated pictures. Yet, as emotional arousal of each individual may be different, which depends on various elements (e.g., form, colors, and abstract designs) which influence their empathy level (Jelinčić and Šveb, 2021). Therefore, although our research focus is relatively specific and contextualised compared to general pictorial analysis, manual processing methods have drawbacks in terms of strong subjectivity, complex identification process and significant result deviation. Future studies may use software such as YOLOV2、Google Cloud Visio and Clarifai among others to identify and visualize content characteristics, including culture, architecture or color (Deng and Li, 2018; Jelinčić and Šveb, 2021) to uncover specific visual factors which may influence the narrative and visitor's involvement, immersion and emotional responses.

Author's note

Images used for pictoral analysis will be provided by the authors upon request.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

YG undertook most writing of preliminary draft and the final version of the paper, proposed the theoretical framework of the paper, and also undertook the data collection and qualitative analysis of the most reviews material. QL, who is the YG's postdoctoral advisor, gave a lot of important suggestions for the whole paper, and revised the sections of introduction and discussion of the paper. TH undertook part of data collection and quantitative analysis and also the preliminary draft of literature review, and did part of editing. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Dialect diversity and total factor productivity: Evidence from Chinese listed companies

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Using a sample of Chinese listed companies over the 2007–2019 period, we examined the influence of dialect diversity on a firm's total factor productivity. We found that dialect diversity affects the psychological distance of interpersonal communication and significantly affects the firm's total factor productivity. The results are robust to a battery of tests based on different specifications. The relationship between dialect diversity and a firm's total factor productivity is more pronounced in state-owned enterprises, firms located in southern regions, and more capital-intensive firms. Furthermore, we demonstrated an innovative factor flow mechanism and a human capital accumulation mechanism through which dialect diversity inhibits total factor productivity. Overall, this paper provides new evidence and decision-making reference for coordinating the protection of dialect diversity and high-quality economic development.

KEYWORDS

dialect diversity, total factor productivity, psychological distance, innovation, element flow, human capital accumulation

Introduction

Since the market-oriented reform and opening up in 1978, China has witnessed tremendous gross domestic product (GDP) growth from <$150 billion in 1978 to $17.7 trillion in 2021. However, China's growth has come mainly from a rising labor supply and rapid capital accumulation, which created significant pressure on its natural resources and the environment, and is unsustainable in the long run. Therefore, China has branched into productivity growth through several high-profile initiatives such as the "Made in China 2025" (Li, 2018). Krugman (1995) points out that "Productivity isn't everything, but in the long run, it is almost everything," which illustrates the importance of productivity. The growth of productivity is considered the main driver of high-quality economic development. Thus, how to effectively improve the total factor productivity of enterprises attracts significant interest from researchers. However, the extant literature focuses on the characteristics of enterprises (Tian and Twite, 2011) and the level of an economic system (Wan and Zhang, 2018; Fu et al., 2021), and fewer papers discuss the influence of informal institutional factors on total factor productivity (TFP) of enterprises, especially for listed companies in China.

China is a multi-ethnic country where multiculturalism coexists, thus providing an ideal setting for studying non-institutional factors and total factor productivity. As the carrier of regional culture, language is not only a vehicle for people's expression and communication but also exerts a subtle influence on individual behavior (Chen, 2013). In recent years, some literature also uses language or dialect as proxy variables of culture (Bian et al., 2019). However, the area of studies related to the economic influence of dialect has developed relatively late and is still in its infancy. The longstanding and heated debates over dialect diversity focus mainly on its relationship with economic performance (Zhu and Grigoriadis, 2022), FDI (Feng et al., 2021), sustainable trade development (Liu et al., 2022), or urban size (Ding et al., 2021), among others; few studies have focused on the effect of multiculturalism on TFP based on micro-enterprise data. Therefore, the current work focuses on one dimension of culture, i.e., language, investigates the effects of dialect diversity on a firm's TFP, and explores the mechanism between them.

Dialect diversity is the accumulation of culture and social psychology, which is the first language of most people. Dialects contain the emotions of people and the country and can better and more directly express thoughts and feelings. Therefore, dialect diversity can influence psychological distance in interpersonal interactions. Psychology-related studies show that managers' perceived similarities affect their attraction (Huston and Levinger, 1978). Compared to dissimilar individuals, similar individuals have more mental dependence and identification, higher perceived similarity, stronger mutual attraction, and more accessible communication, and thus more likely to interact with each other (McPherson et al., 2001). In China, there is a prominent vernacular bond among interpersonal interactions, and the vernacular bias leads to a higher similarity between people who speak the same dialect, increasing the level of trust and facilitating communication. Dialect diversity becomes an extrinsic signal of perceived similarity. However, most of the existing studies focus on the identity effects of dialects (Falck et al., 2012) and the fact that dialects affect the sustainable development of trade (Guiso et al., 2009; Liu et al., 2022), and the cultural differences behind the dialect diversity (Chen, 2013). Few studies have explored the effects of dialect diversity on the TFP of firms from a psychological distance perspective.

To empirically solve the above challenges, we used a sample that contains all non-financial A-share listed firms in China between 2007 and 2019. The main variable used to measure TFP was calculated following previous studies such as Ackerberg et al. (2015), Levinsohn and Petrin (2003), and Wooldridge (2009). In addition, we followed Xu et al. (2015) and Lei et al. (2022) and measured regional cultural diversity through dialect diversity. Based on the analysis of the psychological distance, our empirical results show that regional cultural diversity, represented by dialect diversity, substantially decreased TFP by 3.43%. Specifically, the TFP of firms located in regions with higher dialect diversity is less than those in other regions. Moreover, the results are robust to several robust checks, including two-stage instrumental variable regression to solve the endogenous problem, alternative measures of TFP, and controlling the high-order fixed effect of industry and year.

Although dialect diversity significantly negatively affects firm TFP, this effect exhibits heterogeneity in different dimensions. Based on the subsample test, we further documented that the negative effect of dialect diversity on TFP is particularly pronounced in state-owned enterprises, capital-intensive firms, and firms located in the southern region. After documenting that dialect diversity decreases TFP, we proposed and verified three mechanisms through which dialect diversity could hamper innovation, factor flow, and human capital accumulation.

This study contributes to the literature in several ways. First, our results draw attention to the influence of cultural diversity on micro-enterprise. Previous research on informal institutions primarily focuses on religiosity, gambling, or social trust (e.g., Bjørnskov, 2012; Boone et al., 2013; Wang, 2021; Xie and Wang, 2022). Our findings suggest that it is helpful for firms to focus on the effects of dialect diversity in their localities. As an informal institution, dialect diversity in a region where a firm is located contributes to curbing corporate total factor productivity. Furthermore, we examined the inhibition effect of enterprises in different regions, industries, ownership types, capital intensity, and social trust, which provided evidence of dialect diversity's heterogeneous effect.

Second, we discussed the negative relationship between dialect diversity, a critical informal institution, and the TFP of enterprises, which enriches the research on the factors of TFP. Although the determinants of TFP are extensively discussed in previous works (Hsieh and Klenow, 2009; Xiao et al., 2022), how dialect diversity affects the TFP of listed enterprises has remained unclear. Hence, our research seeks to provide a deeper understanding of how dialect diversity affects TFP and enriches the studies on the relationship between dialect diversity and the TFP of enterprises. In addition, our findings also suggest that innovation mechanisms, factor flow mechanisms, and human capital accumulation mechanisms through which dialect diversity affects firm TFP, which enrich our understanding of the underlying micro-mechanisms that dialect diversity affects by linking our finding to the literature on determinants of firm-level TFP.

The structure of this study is as follows. Section "Literature review and hypothesis development" reviews related literature and develops the hypothesis, section "Research design" discusses the research methodology, section "Empirical results" reports the results of the empirical analysis and provides robustness checks, and section "Further analyses" presents further analyses. Finally, section "Conclusion" offers the conclusion.

Literature review and hypothesis development

Literature review

Literature on dialect diversity

Due to a relatively weak legal system and imperfect formal institutions (Allen et al., 2005; Pistor and Xu, 2005), China is still a guanxi (relationship)-based society, which is affected mainly by informal institutions (Xin and Pearce, 1996; Li, 2003), and the research about culture as a non-institutional factor is insufficient. As an informal institution, culture can influence individuals' personality, cognition, and communication styles (DiMaggio, 1997; Wang, 2021; Xie and Wang, 2022) and even shape human economic behavior (Chen, 2013). Language is the medium of communication and the carrier of culture, which is a crucial indicator for measuring cultural diversity (Gong et al., 2011; Falck et al., 2012; Bian et al., 2019). At present, the research on the influence of dialect diversity on the cultural economy can be divided into three categories.

The subject of the first category of research is differences in cultural concepts behind dialects. Chen (2013) pointed out that the more significant the difference in language, the more considerable the difference in cultural concepts. Therefore, cultural differences caused by the diversity of dialects hinder the spread of institutions and hence affect the diffusion of technology and production factors (Spolaore and Wacziarg, 2009; Spolaore, 2012; Ding et al., 2021). Moreover, cultural differences lead to regional cultural diversity and affect the divided areas' economic performance (Zhu and Grigoriadis, 2022).

The second type of literature focuses on the effects of dialect on transaction costs. Dialect differences tend to make people distrustful, resulting in increased transaction costs (Wang and Ruan, 2019), which is not conducive to teamwork and innovation success. It also increases the transaction cost of enterprise innovation outsourcing and decreases the innovation investment of enterprises (Milliken and Martins, 1996; Zhang and Wang, 2022). However, the presence of a common language reduces the cost of information search when hedging economic risks (Egger and Lassmann, 2015), thus reducing transaction costs in international trade (Melitz, 2008).

The third type of literature emphasizes the identity recognition function of dialects. Dialects have an identity effect; thus, individuals using the same dialect have a higher level of identity (Gumperz, 1982). Dialect diversity influences business innovation through cultural identity (Wang et al., 2022). The identity effect of dialects also affects labor income (Falck et al., 2018), and people speaking local dialects are likely to earn higher income in the labor market (Chen et al., 2014). In addition, it was found that the identity effect of the dialect also affects the behavior of managers and entrepreneurs. For example, the dialect of the CEO and the general manager unanimously reduced the agency cost of the company (Bian et al., 2019).

Although numerous studies have attempted to study the impact of dialect on the economy, most of them have concentrated solely on the macroeconomy. Moreover, few studies have explicitly examined the influence of dialect diversity on enterprise total factor productivity based on psychological distance.

Literature on TFP

At the micro level, previous studies found that the source of TFP is shifting resource allocation from less efficient to more efficient enterprises (Hall and Jones, 1999; Caselli, 2005; Bartelsman et al., 2013). The improvement of capital and labor resource allocation efficiency and talent introduction can promote the improvement of the TFP of enterprises (Hsieh and Klenow, 2009). However, the financial friction caused by resource misallocation decreases TFP (Wang et al., 2021). Moreover, R and D spillover, R and D activities, technology development, and transformation investment can significantly improve enterprise TFP, while financial constraints significantly reduce the enterprise TFP (Caggese and Cuñat, 2013; Xiao et al., 2022). The literature also found a strong coupling between the system and economic development at the macro level. For economies at a particular stage of development, TFP enhancement and economic development can only be promoted by adopting compatible institutions (Acemoglu, 2003; Glaeser et al., 2004). Besides, financial friction leads to resource mismatch and results in the loss of TFP (Wang et al., 2021).

However, most empirical works have focused on the influence of formal systems on TFP. We complement this research gap by focusing on China, the world's most multicultural country, and investigate the influence of dialect diversity on TFP.

Hypothesis development

Language is representative of a nation and culture and affects psychological distance in interpersonal interactions (Xu et al., 2015). Different nationalities and cultures have different customs and habits, which also cause language barriers. However, shared cultural preferences close the psychological distance between people, making it easier for people to communicate with each other. As a cultural carrier, language is the primary tool for people to exchange information. Language differences not only create communication barriers but also reduce the similarity between members and affect the psychological distance of interpersonal interactions. It reduces the level of social trust and leads to weak social relationships and a lack of trust in interpersonal interactions (Pendakur and Pendakur, 2002).

First, the increased psychological distance between individuals reduces communication and collaboration efficiency and makes transactions and collaboration more costly. Dialect diversity increases the psychological distance in firms, affects communication and exchange, reduces economic interaction and cooperation, increases transaction costs (Wang and Ruan, 2019), and reduces the level of innovation in firms (Zhang and Wang, 2022), which hinders TFP.

Second, dialect diversity reduces the perceived similarity of individuals, causing fragmentation of social networks and indirectly raising the barriers to the integration of elements such as people and property. The more complex the linguistic environment of a region, the greater the cultural differences, the greater the psychological distance between individuals, and the greater the degree of fragmentation of social networks tends to be. As a result, the tendency for factors of production and technology to flow in will be significantly weaker since people prefer to work in regions with similar dialectal cultures and simple language environments (Falck et al., 2012; Ding et al., 2021).

Finally, dialect diversity is a symbol of social identity, and its identification effects create a psychological distance between members of different dialect groups. Linguistic similarities bring each other closer psychologically, while differences may be labeled as "not my kind," creating "in-group preferences" and "out-group discrimination" (Tajfel, 1974; Hazen, 2001). Groups with different dialectal diversity have different dialectal identities, are prone to mutual distrust and disagreement, and reduce economic interactions and cooperation (Feng et al., 2021), thus creating an implicit barrier to increasing the TFP of firms.

The above analyses lead to the first testable hypothesis:

H1: *Dialect diversity has an inhibitory effect on TFP.*

In addition to the main research question, we intend to explore how dialect diversity affects TFP.

Technological progress and resource allocation optimization are critical paths to improving TFP (Perelman, 1995; Dong et al., 2021). Resource allocation allocates limited combinations of factors of production in more efficient sectors to achieve optimization of input factor structures, which improves TFP (Wang et al., 2021). Li and Meng (2014) pointed out that the labor force tends to flow relatively easily between regions with the same dialect, and dialect diversity hinders the flow of production factors (Ding et al., 2021). Falck et al. (2012) proposed that dialect diversity affects population mobility. When the linguistic environment is too complex, different cultures will lead to a lower level of social trust, thus hindering the mobility of labor factors. Dialect diversification reduces social trust between groups through identity effects, hinders the free flow of production factors, and thus inhibits TFP.

Innovation can increase a firm's productivity by enhancing its innovation capabilities and absorbing advanced external technologies (Xiao et al., 2022). However, studies show that dialect diversity inhibits business innovation. Wang et al. (2022) found that dialect diversity leads to communication barriers, hinders inter-group communication, discourages technology diffusion, and significantly inhibits firms' innovation. Furthermore, Hu et al. (2022) pointed out that dialect diversity contributes to cultural differences, which reduce mutual attraction and opportunities for cooperation and communication and hence reduce innovation input. As a result, dialect diversity increases transaction costs, creates cultural differences, and reduces firms' innovation inputs, decreasing TFP.

Based on this, we propose the following hypotheses.

H2: *Dialect diversity hinders the free flow of production factors and hence decreases TFP.*

H3: *Dialect diversity reduces innovation inputs and hence inhibits TFP.*

Furthermore, human capital accumulation plays a positive role in TFP (Salinas-Jiménez et al., 2006). Human capital has a knowledge effect and can either promote technological progress through active R and D innovation (Poncet et al., 2010) or boost technological innovation by learning, imitating, and mastering advanced technologies (Chang et al., 2019), thus increasing TFP. However, dialect diversity inhibits human capital accumulation. The more complex and diverse the dialects of a region, the less conducive it is for outsiders to master the local dialect, which indirectly raises the cost of environmental integration and hinders the cross-regional mobility of talents (Zhang and Wang, 2022). If a region has more dialects, it may imply the reluctance of people in this region to accept other dialects or learn foreign languages (Pendakur and Pendakur, 2002). Drummond (2013) also found that dialects severely affect English language learning ability, causing some students to drop out of school and preventing the residents from developing their abilities. In conclusion, dialect diversity prevents residents from improving their abilities, inhibits the accumulation of human capital, and thus reduces the TFP of enterprises.

As such, we propose the following hypothesis:

H4: *Dialect diversity is detrimental to regional human capital accumulation, inhibiting firms' TFP.*

Research design

Sample selection

Following Du et al. (2022) and Lei et al. (2022), our sample included Chinese A-share listed companies from 2007 to 2019. We started our sample period in 2007 because it was the year that China adopted the International Accounting Standard. The financial data were retrieved from the Wind and China Stock Market & Accounting Research (CSMAR) databases. The data on provinces and cities were obtained from the China Statistical Yearbook and the China City Statistical Yearbook. At the same time, data on the dialect diversity in the region where the firms were located was obtained from a dialect database constructed by Xu et al. (2015). Following Du et al. (2022) and Lei et al. (2022), we cleaned the sample as follows: (1) companies in the financial industries were removed; (2) samples with missing data were dropped; (3) ST and *ST company samples were excluded; (4) continuous variables were winsorized at the levels of 1% and 99%. After the above screening, the whole sample consisted of 10,875 firm-year observations.

Model specification and variable definition

Following Tian and Twite (2011) and Lei et al. (2022), we employed the following regression model to test whether dialect diversity affected TFP as predicted:

$$\boldsymbol{TFP_{it} = \alpha + \beta Diver_{it} + \sum Controls_{it} + Year + Industry + \varepsilon} \quad (1)$$

where TFP_{it} represents TFP of firm i in year t. $Diver_{it}$ is dialect diversity index, $\sum Controls_{it}$ represents control variables, ε is the error term, and α and β are the coefficients to be estimated. We controlled for industry and year-fixed effects to mitigate industry differences and economic fluctuation. All the standard errors in the regression were clustered at the firm level.

Dependent variables

There are many methods to calculate TFP, such as Levinsohn and Petrin (2003) (LP for short), Olley and Pakes (1996) (OP for short), and Ackerberg et al. (2015) (ACF for short). However, compared with other methods, the ACF can overcome the endogenous function and the time-varying parameters and measure the TFP more accurately (Bournakis and Mallick, 2018). Hence, we used the ACF method to estimate TFP (henceforth *TFP_ACF*), which was estimated by the following equation:

$$\begin{aligned}\boldsymbol{LnY_{it}} &\boldsymbol{= \beta_0 + \beta_k LnK_{it} + \beta_l LnL_{it} + \beta_m LnM_{it} + \beta_a Age_{it}} \\ &\boldsymbol{+ \beta_s Soe_{it} + Year + Industry + \varepsilon} \quad (2)\end{aligned}$$

where Y is the output variable, proxied by operating income; L is the labor input, measured by the number of employees; K is the capital input, measured by net fixed assets; M is the intermediate input, expressed by the cash for buying goods and receiving services. *Age* is the enterprise age; *Soe* is an indicator variable equal to one for state-owned enterprises and zero otherwise. *Year* and *Industry* are year and industry fixed effects, respectively. Referring to the existing literature (Yu and Qi, 2022), we also used the LP and WRDG methods as alternative estimates in the robustness check.

Explanatory variables

The core explanatory variable $Diver_i$ was used to measure the dialectal diversity of the city. The key independent variable of interest was the diversity level of dialects in each city. This indicator was obtained from Xu et al. (2015), Wang J. et al. (2021), and Lei et al. (2022), and it measured the dialect diversity of city j by considering the number of people who used different dialects. $Diver_i$ was calculated as equation (3):

$$\boldsymbol{Diver_{it} = 1 - \sum\nolimits_{j=1}^{N} S_{ij}^2} \quad (3)$$

where S_{ij} refers to the proportion of the population speaking dialect j in city i, and N is the number of dialects spoken in the city. The value range of $Diver_{it}$ was from 0 to 1.5. The larger the value, the higher the degree of dialect diversity it represents.

Control variables

Following Kong et al. (2020), Wang J. et al. (2021), and Lei et al. (2022), we also included two sets of control variables related to firm-specific and region-specific characteristics, respectively. The firm-specific variables included (1) firm size (*Size*), which is the natural logarithm of the total assets of the enterprise; (2) debt-to-asset ratio (*Lev*), which refers to the ratio of total liabilities to total assets; (3) return on assets (*Roa*), which is the ratio of the net income over total assets; (4) main business revenue growth (*Growth*), which refers to the difference between current-year main business revenue and prior-year main business revenue to prior-year sales; and (5) ownership concentration (*Top10*), which pertains to the shareholding ratio of the top 10 shareholders.

The region-specific variables include economic growth (*GDP_city*), which represented the city's actual per capita GDP, and fixed-asset investment (Fixedcapital_GDP), which is the first 3-year average of the proportion of fixed asset investment to GDP in each province. Finally, we controlled for year- and industry-fixed effects.

Empirical results

Descriptive statistics of variables

Table 1 presents descriptive statistics of the main variables. The mean of *TFP_ACF* was 9.502, with a maximum value of 12.09 and a minimum value of 7.806, indicating that *TFP_ACF* varied largely among firms. Moreover, the differences between Diver's maximum and minimum values were significant, implying that regional cultural diversity varies largely among cities, providing a suitable setting for our study. The results

TABLE 1 Summary statistics.

Variables	N	Mean	SD	Median	Min	Max
TFP_ACF	10,875	9.502	0.863	9.388	7.806	12.090
Diver	10,875	0.226	0.194	0.228	0.002	0.653
GDP_city	10,875	8.231	3.916	7.899	1.428	18.960
Fixedcapital_GDP	10,875	0.558	0.243	0.557	0.172	1.165
Size	10,875	22.210	1.317	22.020	19.590	26.380
Lev	10,875	0.466	0.209	0.468	0.053	0.940
Roe	10,875	0.060	0.118	0.065	−0.701	0.329
Growth	10,875	0.455	1.333	0.131	−0.733	9.639
Top10Hold	10,875	56.640	15.560	57.260	22.410	96.29

This table reports the descriptive statistics of main variables. Specifically, it includes the mean, standard deviation (SD), median, minimum (Min), and maximum (Max) distributions.

of the remaining control variables were also in line with expectations and were not required to be repeated.

Results of the multivariate regression

Table 2 reveals dialect diversification's influence on enterprises' TFP based on Equation (1). Column (1) reports the results without control variables, and column (2) is the regression results with control variables. The results in column (1) show that dialect diversification is negatively related to the TFP of a firm when only the industry- and annual-fixed effects are controlled. The estimated coefficient of *Diver* was −0.303 (SE value = 0.085), which was significant at the level of 1%. After adding the control variables at the company and regional levels, the estimated coefficient of *Diver* in column (2) was still significantly positive at the level of 1%. The above results were not only statistically significant but also economically significant. Compared with the sample average and median, TFP decreased by 3.39% (=0.322/9.502) and 3.43% (=0.322/9.388), respectively. Baseline regression results show that dialect diversification significantly and negatively affected TFP, suggesting that **Hypothesis 1** in this paper cannot be rejected.

When the coefficients of control variables are significant, consistent with previous studies, coefficients such as *Size*, *Growth*, and *Top10Hold* are positive and significant. According to Sleuwaegen and Goedhuys (2002), the larger the enterprise (*Size* is large), the stronger its ability to purchase advanced equipment and attract technical personnel, and the more capital to invest in R&D activities, thereby improving the TFP. The growth of an enterprise (*Growth*) is significantly and positively correlated with TFP, indicating that the better the growth of an enterprise, the greater the investment expenditure, and the faster the speed of product and services and technology updates further to improve TFP (Palia and Lichtenberg, 1999). In addition, our finding on ownership concentration (*Top10Hold*) was also consistent with those in Holderness and Sheehan (1988) in that equity concentration is positively related to innovation. The improvement of innovation ability promotes enterprise efficiency and further improves TFP.

Robustness test

Two-stage instrumental variable regression

Following Wang J. et al. (2021), we employed the Chinese topographic fluctuation index (Slope) as the instrumental variable to solve the potential endogenous problem and estimate it using the two-stage least squares method (2SLS). On the one hand, the geographical factors were closely linked to dialect formation; that is, the more complex the terrain, the more geographic obstacles in the region. Then, it is more likely to be divided into different areas, producing various dialects. As a result, each dialect area will form a unique local culture. On the other hand, the TFP of enterprises would have difficulty affecting the natural condition of the terrain, especially in modern society. The increasing convenience of transportation and the continuous development of construction technology has gradually lessened the effect of terrain slope on enterprise business activities.

The 2SLS regression results are presented in Table 3. Column (1) shows that the relief degree of the land surface (*Slope*) was positively related to regional cultural diversity, suggesting that the greater the topography of an area, the more diverse the dialects of the area. Meanwhile, the values of the F statistic were 35 (far >10), which shows that the instrumental variable we designed was appropriate and no weak instrumental variable problem exists. Finally, column (2) shows that the relationship between regional cultural diversity and TFP was significantly negative at the 5% level in the second-stage regressions, and the absolute value of the coefficient was larger than the results of the baseline regression, which shows that

TABLE 2 Results for the effect of dialect diversity on TFP.

	(1) TFP_ACF	(2) TFP_ACF
Diver	−0.303***	−0.322***
	(0.085)	(0.074)
GDP_city		0.015***
		(0.005)
Fixedcapital_GDP		−0.120
		(0.077)
Size		0.180***
		(0.013)
Lev		0.519***
		(0.084)
Roe		1.364***
		(0.101)
Growth		0.021***
		(0.008)
Top10Hold		0.003***
		(0.001)
Year FE	YES	YES
Industry FE	YES	YES
N	10,875	10,875
Adj. R^2	0.243	0.407

This table reports the impact of dialect diversity on firm's total factor productivity. The dependent variable is total factor productivity (TFP_ACF) and calculated using the ACF method. Diver is the dialectal diversity indicator taken from Xu et al. (2015) and Wang J. et al. (2021) to measure the dialectal diversity of the city. Column (1) reports the regression without control variables, and column (2) adds control variables. The definition of all variables can be seen in section "Model specification and variable definition." All regressions control for Industry FE and Year FE and T-statistics are provided in parentheses.
***, **, and * indicate significance at the 1, 5, and 10% levels, respectively. Standard errors are clustered at the firm level.

dialect diversity had a significant and robust inhibitory effect on TFP.

Alternative measure of TFP

Following Levinsohn and Petrin (2003) and Wooldridge (2009), we did a series of robustness tests using the LP and WRDG methods to measure firm productivity. The coefficient estimates obtained by the OLS can be biased; the LP method can overcome this drawback and better cope with simultaneity and sample selection problems (Zhang and Liu, 2017). The WRDG method was based on the GMM model, further improving the LP and ACF methods.

Table 4 presents the robustness checks using the LP and WRDG methods. The core explanatory variable *Divers*' coefficient was significantly negative in columns (1) and (2), indicating that the robustness regression results still support this paper's baseline conclusions.

TABLE 3 Regression results based on the instrumental variable method.

	(1) First-stage regressions *Diver*	(2) Second-stage regressions *TFP_ACF*
Slope	0.051***	
	(0.006)	
Diver		−0.823**
		(0.374)
Control	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
N	10,825	10,875
Adj. R^2	0.058	0.394

This table reports the results of the instrumental variable regression. Slope is the Chinese topographic fluctuation index. The definition of all other variables can be found in section "Model specification and variable definition." A series of fixed effects are also included, and T-statistics are provided in parentheses.
*** and ** indicate significance at the 1 and 5% levels, respectively. Standard errors are clustered at the firm level.

TABLE 4 Robustness checks using an alternative TFP measure.

	(1) TFP_LP	(2) TFP_WRDG
Diver	−0.151**	−0.139**
	(0.070)	(0.069)
Control	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	10,875	10,869
Adj. R^2	0.652	0.845

This table reports the results of the robustness checks measuring TFP using other methods. TFP_LP represents the TFP measured by the LP method, and TFP_WRDG represents the TFP measured by the WRDG method. The definition of all other variables can be found in section "Model specification and variable definition." A series of fixed effects are also included and T-statistics are provided in parentheses.
The ** symbol indicates the significance at the 5% level. Standard errors are clustered at the firm level.

Further analyses

Mechanism analyses

This part examines the intermediary effect of factor flow, human resource accumulation, and innovation. According to the relevant analysis in the second part, factor flow, the accumulation of human capital, and innovation investment influence the relationship between dialect diversity and TFP.

First, dialect diversity produces cultural segmentation in different regions. The more local dialect diversity, the lower the level of social trust would be, which raises the barriers to the integration of production factors and hinders the flow of labor and capital between different regions (Falck et al., 2012; Ding et al., 2021).

Second, dialect diversity is not conducive to outsiders mastering the local language; it hinders the introduction of advanced talents and knowledge and significantly affects the accumulation of local human capital, thereby affecting enterprises' TFP.

Finally, dialect diversity also decreases the TFP of enterprises through innovation input; the effects of innovation may be explained in at least two different ways. First, dialect diversity is not conducive to communication because it increases information asymmetry and transaction costs (Milliken and Martins, 1996), reducing enterprise innovation investment and inhibiting enterprise TFP (Xiao et al., 2022). Second, dialect diversity inhibits factor mobility and human capital accumulation in firms, leading to market segmentation and diminishing the scope for firms to be compensated for innovation inputs through economies of scale, thereby reducing firms' innovation investment (Foellmi and Zweimüller, 2006), which affects firms' TFP.

Verification of factor flow mechanism

Referring to Baron and Kenny (1986), the following mediation effect model was constructed to investigate whether dialect diversity can affect the TFP of enterprises through the factor flow mechanism.

$$TFP_{it}=\alpha+\beta Diver_i+\sum Controls_{it}+Year+Industry+\varepsilon \tag{4}$$

$$Flow_{it}=\alpha+\beta Diver_i+\sum Controls_{it}+Year+Industry+\varepsilon \tag{5}$$

$$TFP_{it}=\alpha+\beta_1 Diver_i+\beta_2 Flow_{it}+\sum Controls_{it}+Year+Industry+\varepsilon \tag{6}$$

$Flow_{it}$ in formulas (5) and (6) represents factor flow, including capital and labor flows. Capital flow ($Klow_{it}$) was measured using the logarithm of municipal fixed asset investment. Labor flow ($Llow_{it}$) was measured by the proportion of the difference between the permanent resident population and the registered population. Other control variables remained the same as described above. The estimated results of the factor flow mechanism test are reported in Table 5.

Panel A of Table 5 shows the mechanism analyses results of capital flow. Column (2) presents the regression result of the model (5). It shows that the regression coefficient of capital flow (*Kflow*) on *Diver* was negative and significant at 1%, indicating that dialect diversification significantly suppressed capital inflow under the control of other unchanged variables. Column (3) presents the estimation result of the model (6). After the inclusion of the intermediary variable *Kflow*, the absolute value of the *Diver* coefficient was significantly smaller, and the coefficient of capital flow (*Kflow*) was significantly positive, indicating that dialect diversity hinders the free flow of capital, thereby inhibiting TFP.

Panel B of Table 5 shows the results of the mediation test for labor flow. Columns (2) and (3) indicate the regression of models (5) and (6), respectively. The coefficients *Diver* in column (2) was significantly negative. After including the intermediary variable *Lflow*, the absolute value of the *Diver* coefficient was significantly smaller in column (3), indicating that dialect diversity hindered the labor flow and thus decreased the TFP. The regression results in Table 5 indicate that dialect diversification can suppress the TFP of enterprises through the factor flow mechanism. Therefore, **Hypothesis 2** holds.

Verification of human capital accumulation mechanism

The following model was constructed to investigate whether dialect diversity can affect the TFP of enterprises through the human capital accumulation mechanism.

$$TFP_{it}=\alpha+\beta Diver_i+\sum Controls_{it}+Year+Industry+\varepsilon \tag{7}$$

$$Perstu_{it}=\alpha+\beta Diver_i+\sum Controls_{it}+Year+Industry+\varepsilon \tag{8}$$

$$TFP_{it}=\alpha+\beta_1 Diver_i+\beta_2 Perstu_{it}+\sum Controls_{it}+Year+Industry+\varepsilon \tag{9}$$

The $Perstu_{it}$ in formulas (8) and (9) represents the accumulation of human capital, as measured by the proportion of students in urban institutions of higher learning in the total population (Chen et al., 2013). Other variables are illustrated above.

Table 6 lists the results of the intermediary mechanism test of human capital accumulation. Columns (2) and (3) provide the estimation results of models (8) and (9), respectively. The effect of *Diver* on human capital accumulation was significantly negative in column (2). However, after controlling the intermediary variable human capital accumulation (*Perstu*), the absolute value of the Diver's coefficient was smaller in column (3), and the coefficient of *Perstu* on TFP was significantly positive, which indicates dialect diversity hindered human capital accumulation, and thus inhibited TFP of the enterprise. Therefore, **Hypothesis 3** holds.

TABLE 5 Results for mechanism analyses: factor flow.

Panel A: Capital flow

	(1)	(2)	(3)
	TFP_ACF	*Kflow*	*TFP_ACF*
Diver	−0.322***	−0.577***	−0.285***
	(0.074)	(0.082)	(0.075)
Kflow			0.063***
			(0.021)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
N	10,875	10,875	10,875
Adj. R^2	0.407	0.371	0.409

Panel B: Labor flow

	(1)	(2)	(3)
	TFP_ACF	*Lflow*	*TFP_ACF*
Diver	−0.322***	−0.249***	−0.262***
	(0.074)	(0.019)	(0.077)
Lflow			0.241***
			(0.089)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
N	10,875	10,875	10,875
Adj. R^2	0.407	0.544	0.409

This table presents the factor flow mechanism results between dialect diversity and TFP. Kflow is measured by the logarithm of municipal fixed asset investment. Lflow is measured by the proportion of the difference between the permanent resident population and the registered population in the registered population. Panel A reports the mechanism analyses results of capital flow, and Panel B reports the results of the mediation test for labor flow. The definition of all other variables can be seen in section "Model specification and variable definition." A series of fixed effects are also included, and T-statistics are provided in parentheses.
The *** symbol indicates the significance at the 1% level. Standard errors are clustered at the firm level.

Verification of innovation mechanism

The following mediation effect model was constructed to investigate whether dialect diversity can affect the TFP of enterprises through an innovation mechanism.

$$TFP_{it}=\alpha+\beta Diver_i+\sum Controls_{it}+Year+Industry+\varepsilon \tag{10}$$

$$LnRD_{it}=\alpha+\beta Diver_i+\sum Controls_{it}+Year+Industry+\varepsilon \tag{11}$$

$$TFP_{it}=\alpha+\beta_1 Diver_i+\beta_2 LnRD_{it}+\sum Controls_{it}+Year+Industry+\varepsilon \tag{12}$$

TABLE 6 Results for mechanism analyses: human capital accumulation.

	(1)	(2)	(3)
	TFP_ACF	*Perstu*	*TFP_ACF*
Diver	−0.322***	−0.249***	−0.288***
	(0.074)	(0.019)	(0.074)
Perstu			0.482***
			(0.183)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
N	10,875	10,875	10,875
Adj. R^2	0.407	0.264	0.408

This table presents the human capital accumulation mechanism results between dialect diversity and TFP. Perstu represents the accumulation of human capital, as measured by the proportion of students in urban institutions of higher learning in the total population. The definition of all other variables can be seen in section "Model specification and variable definition." A series of fixed effects are also included and T-statistics are provided in parentheses.
The *** symbol indicates the significance at the 1% level. Standard errors are clustered at the firm level.

In formulas (11) and (12), $LnRD_{it}$ represents the logarithm of innovation input. Following Zhang and Wang (2022), the ratio of R and D investment and the total number of R and D employees indicate the innovation investment. Other variables are consistent, as described above.

Table 7 reports the results of the innovative mediation mechanism. Columns (2) and (3) provide the estimation results of models (11) and (12), respectively. We found that the coefficient of *Diver* was significantly negative in column (2). However, after adding intermediary variable innovation input (*LnRD*), the absolute value of the Diver's coefficient was smaller, and the coefficient of *LnRD* on TFP was significantly positive, indicating that dialect diversity reduces enterprise innovation input and inhibits enterprise TFP. Hence, **Hypothesis 4** holds.

Cross-section analysis

Region-based difference analysis

China has vast lands and abundant resources, separating the northern and southern regions, thus forming different cultures, and its cultural differences are also reflected in the dialects. The formation of dialects is closely related to the natural geographical barrier. The north has few rivers and mountains, the terrain is flat, and the difference between different local dialects is slight. Most of the northern dialects are also called "Mandarin." In the south, mountains, rivers, lakes, and seas abound, and the terrain is undulating and changeable. As a result, considerable differences between dialects can be observed, making communication between dialects challenging.

TABLE 7 Results for mechanism analyses: innovation.

	(1) *TFP_ACF*	(2) *LnRD*	(3) *TFP_ACF*
Diver	−0.322***	−0.432**	−0.319***
	(0.074)	(0.173)	(0.074)
LnRD			0.005*
			(0.003)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
N	10,875	10,875	10,875
Adj. R^2	0.407	0.638	0.407

This table presents the innovation mechanism results between dialect diversity and TFP. LnRD represents the logarithm of innovation input. as measured by the ratio of RandD investment and the total number of RandD employees. The definition of all other variables can be seen in section "Model specification and variable definition." A series of fixed effects are also included and T-statistics are provided in parentheses.
***, **, and * indicate significance at the 1, 5, and 10% levels, respectively. Standard errors are clustered at the firm level.

Therefore, if cultural diversity inhibits enterprises' TFP, it can be expected that compared with the northern region, the complex language environment of the southern region will make the factor flow more difficult, reduce innovation investment, and further inhibit the TFP of enterprises.

To test this conjecture, we refer to Liu et al. (2019) to set the south of the Yangtze River as the southern region and the north of the Yangtze River as the northern region. The regression results are shown in Panel A of Table 8, and the regression coefficient of *Diver* was only significant in the southern region, indicating that dialect diversification's inhibitory effect on enterprises' TFP was more significant in the southern region. The views of this paper are, therefore, verified.

Industry-based difference analysis

Technology makes several ambiguous arguments. In general, when a merger takes place between two high-tech firms, the management or employees communicate using concise and clear technology words. Thus, the high-tech industry is less influenced by cultural differences. We tested this conjecture by dividing the sample between high-tech and non-high-tech industries. We expected to find that the effect of linguistic distance, one aspect of cultural difference, would be weaker in the high-tech industry (Li et al., 2018).

Panel B of Table 8 presents the regression results for high-tech and non-high-tech industries. All control variables are the same as those in Table 2. The coefficient of *Diver* was more significant for the non-high-tech industry, suggesting that language friction plays a more significant role in industries such as manufacturers and retailers.

TABLE 8 Results of the effect of dialect diversity on TFP in different subsamples.

Panel A: Northern region vs. southern region

	North (1)	South (2)
Diver	0.013	−0.475***
	(0.124)	(0.110)
Control	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	4,825	5,065
Adj. R^2	0.431	0.422

Panel B: high-tech industry vs. non-high-tech industry

	High-tech (1)	Non-high-tech (2)
Diver	−0.219**	−0.386***
	(0.086)	(0.132)
Control	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	5,479	4,388
Adj. R^2	0.263	0.461

Panel C: SOEs vs. non-SOEs

	Non-SOEs (1)	SOEs (2)
Diver	−0.222**	−0.380***
	(0.089)	(0.118)
Control	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	4,823	5,158
Adj. R^2	0.379	0.439

Panel D: capital-intensive vs. non-capital-intensive enterprises

	Non-capital intensive (1)	Capital-intensive (2)
Diver	−0.474***	−0.163
	(0.115)	(0.104)
Control	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	4,521	4,448
Adj. R^2	0.331	0.424

(Continued)

TABLE 8 (Continued)

Panel E: social trust

	Low trust	High trust
	(1)	**(2)**
Diver	−0.414***	−0.139
	(0.093)	(0.088)
Control	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	4,188	6,053
Adj. R^2	0.417	0.408

This table reports the baseline regression results of estimating the impact of dialect diversity on TFP in different subsamples. In Panel A, B, C, D, and E, we used region, industry, corporate ownership types, capital intensity, and social trust to group the subsamples, respectively. The definition of all other variables can be seen in section "Model specification and variable definition." A series of fixed effects are also included, and T-statistics are provided in parentheses.

*** and ** indicate significance at the 1 and 5% levels, respectively. Standard errors are clustered at the firm level

Property rights-based difference analysis

State-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) have specific differences in financing constraints and internal control (Johnson et al., 2002). Whether this difference affects the relationship between dialect diversification and TFP was one of the issues explored in this paper. Therefore, we grouped the samples according to SOEs and non-SOEs.

Panel C of Table 8 presents the regression results for non-SOEs and SOEs, respectively. The Table indicates that the regression results for SOEs were negative and significant at a 1% level. At the same time, the coefficients for the non-SOEs were also positive but much smaller and more insignificant in the measurement of TFP, indicating that dialect diversification on TFP plays a more significant role for SOEs.

Specifically, SOEs have the social responsibility to address employment issues, and the flow of employees is poor, making it easier for them to group small groups, which increases the negative effects of dialect diversification on the TFP of enterprises; however, the high employee turnover rate of non-SOEs suppresses the identity effect of dialects. Meanwhile, the labor force flow brings advanced knowledge and technology to enterprises and weakens the inhibitory effect of dialect diversification on the TFP of non-SOEs.

Capital intensity-based difference analysis

Compared with labor-intensive enterprises, capital-intensive enterprises tend to have a greater demand for advanced technology and talents and focus more on the quality of the labor force. Therefore, the specialized knowledge and skills of employees in this industry have a decisive effect on enterprise productivity (Kahn and Lim, 1998; Lepak et al., 2003), while dialect diversification suppresses enterprise capital flow and human capital accumulation, thus suppressing enterprise TFP.

On the one hand, the dialects in different regions vary greatly, and communication barriers are formed between the regions, which reduce the flow and allocation of capital, hinder the capital accumulation of the regions, and inhibit enterprise TFP. On the other hand, dialect diversification affects the flow of people between regions, which is not conducive to the accumulation of human capital of enterprises, hinders the introduction of advanced talents, and suppresses the TFP of enterprises. Therefore, this paper expected high capital-intensive enterprises to be more vulnerable to dialect diversification's inhibitory effect on enterprise TFP. This paper, referring to Li and Sheng (2019), measured the capital intensity of enterprises with the natural logarithm of fixed net asset value and the number of employees and grouped the samples according to the median capital intensity. The enterprises above the median are capital-intensive enterprises, and those below the median are set as labor-intensive enterprises.

The regression results are shown in Panel D in Table 8. The regression coefficient of *Diver* was only significant in capital-intensive industries, indicating that dialect diversification has a more significant inhibitory effect on TFP in capital-intensive industries. The views of this paper were verified.

Social trust-based difference analysis

The external environment may influence innovation and factor mobility of enterprises. Specifically, we argue that social trust may significantly affect firms' innovation and factor mobility. First, social trust affects the innovation of enterprises (Ajzen, 1985). Research in sociology shows that social trust enables people to form an emotional relationship with one another and to reduce the distance in their interpersonal communication (Giddens, 1990). When the level of social trust (Van Lange et al., 1998; Yang and Farn, 2009) is high, individuals are more inclined to engage in altruistic behavior and share resources with others. Therefore, improving social trust can reduce cliquish behavior, reduce communication costs, promote cooperative behavior, and enhance corporate innovation, thereby reducing dialect diversity's negative effect on firms' TFP. Second, social trust affects the factor flow of enterprises. In a higher social trust environment, actors have excellent and stable expectations for the counterparties, which reduces transaction uncertainty, decreases information asymmetry and transaction costs, reduces waste and mismatch of resources, improves the efficiency of resource utilization, and reduces the negative effects of dialect diversity on the TFP of enterprises.

Referring to Li et al. (2019) and Liu and Li (2019), we used the Social Trust Index of each province obtained from the Chinese General Social Survey to measure social trust. The samples were also grouped by the median of the provincial social trust index. Panel E of Table 8 displays the regression results.

The regression results in column (1) indicate that regional cultural diversity significantly and negatively correlates with corporate philanthropy in regions with lower social trust. In column (2), however, the coefficients of *Diver* are insignificant. The combined results indicate that higher social trust weakens the negative relationship between dialect diversity and TFP by increasing innovation and factor flow.

Conclusion

In this study, we examined whether and how dialect diversity affects the TFP of listed companies from the perspective of psychological distance. Unlike previous studies, we investigated the effect of informal institutions such as dialect diversity on TFP (e.g., Feng et al., 2021; Fu and Zhang, 2022; Wang et al., 2022). Using all Chinese-listed firms from 2007 to 2019, we found that dialect diversity significantly inhibits a firm's TFP. This conclusion still holds after considering the endogenous problem and redefining the variables. Further research indicated that this negative effect was more pronounced for southern firms, capital-intensive firms, state-owned enterprises, and firms in non-high-tech industries. The results of the mechanism test indicated that factor mobility, human capital accumulation, and innovation were three critical ways dialect diversity affects firm innovation.

The findings of this study have some policy implications. First, policy formulation should consider the effects of informal institutions. This paper finds that dialect significantly suppresses TFP. Informal systems can sometimes play a more significant social role than formal systems, especially in countries where formal systems are not yet in place (Liu et al., 2022). If the influence of informal institutions is ignored in the policy formulation process, it may lead to actual policy effects deviating from expectations. Second, cultural barriers should be removed to improve the level of trust. We found that dialect diversity created cultural segmentation, increased transaction costs, and reduced trust levels, impeding factor mobility, human capital accumulation, and innovation, significantly inhibiting firms' TFP. Therefore, while protecting regional cultural diversity, cultural barriers between different regions should be actively eliminated to improve the level of trust, achieve optimal allocation of factors, and reduce the harm of dialects on TFP.

We identified some limitations of our study and discussed directions for future research. First, more sample data are needed for our study. Missing data from remote areas may have had specific effects on the regression results. Second, transmission channel issues must be addressed because many factors affect TFP. Finally, future studies could explore the linkage between dialects and TFP when more data become available.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Cultural factors and senior tourism: Evidence from the Chinese context

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Recently, numerous studies have focused on tourism among the older population. Of them, most reported on status analysis, tourism motivation, and tourism model, to name a few; however, there was a lack of comprehensive synthesis and analysis of the motivation, influencing factors, policy impact, and other factors of older tourism. Thus, this study conducted various keyword searches among both English and Chinese publications. We found that older population's tourism is affected by various factors, such as travel expense, physical condition, the length and distance of a trip, and cultural influence. The results provide a reference for the development and implementation of tourism among the older population.

KEYWORDS

older population tourism, tourism motivation, culture influence, older population tourism products, tourism experience

Introduction

According to World Bank data, the proportion of the population aged 65 and over in China doubled from 6.81% in 2000 to 12.41% in 2021 (The World Bank, 2021). Due to rapid economic development (Figure 1), great changes have taken place in China over the past few decades. Urbanization has increased rapidly, with the number of cities increasing from 193 in 1978 to 687 in 2020 (Li and Li, 2022). Further, the proportion of the urban population increased from 26.44% in 1990 to 63.89% in 2020, with an average annual growth rate of 1.09%. Compared with 2010, the proportion of the urban population increased by 14.21% (China Statistics Press, 2021; National Bureau of Statistics of China, 2021). Moreover, according to data from the China Statistical Yearbook 2021, the number of domestic tourists increased from 4.435 billion in 2016 to 6.006 billion in, 2019 (National Bureau of Statistics of China, 2021). Under the influence of the coronavirus disease, 2019 (COVID-19), there were still 2.879 billion tourists in 2020 (National Bureau of Statistics of China, 2021). With continuous economic improvement, people increasingly choose to travel.

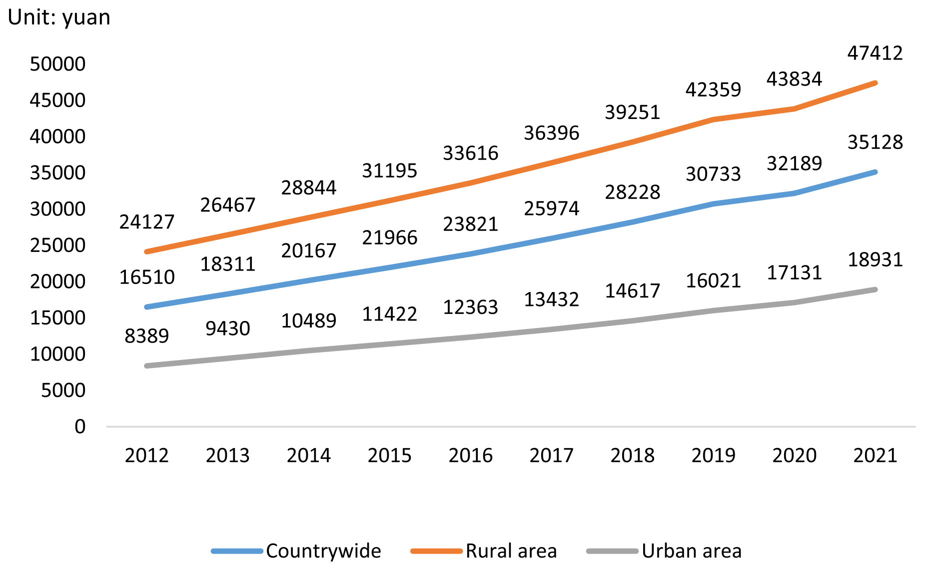

FIGURE 1
Disposable income *per capita* from 2012 to 2021. Data compiled by National Bureau of Statistics of China (2021).

TABLE 1 Forecast results of the Chinese older population from 2015 to 2050.

	60–64	65–69	70–74	75–79	80–84	85–89	>90	Total
2015	7,890	5,583	3,781	2,840	1871	885	388	23,237
2020	7,486	7,509	5,134	3,254	2,222	1,234	638	27,478
2025	9,911	7,124	6,908	4,420	2,546	1,464	928	33,302
2030	11,608	9,433	6,552	5,949	3,460	1,679	1,168	39,849
2035	10,916	11,048	8,678	5,641	4,661	2,281	4,380	44,606
2040	8,941	10,389	10,165	7,475	4,418	3,077	1795	46,258
2045	9,268	8,510	9,558	8,755	5,856	2,915	2,395	47,258
2050	11,660	8,824	7,830	8,232	6,861	3,867	2,545	49,818

Meanwhile, population ageing has become a general trend in human development. The ageing population is an increasingly severe issue and presents problems that have gradually affected all aspects of society, the economy, culture, and life (Huang and Chen, 1999). As a developing country, China has had a very obvious trend of population ageing since the 1970s. Table 1 shows the total number of the older population (over 60 years of age), according to prediction results for 2015–2050. In five-year intervals, the older population will be 232, 275, 333, 398, 446, 463, 473, and 498 million, respectively (Chen et al., 2018). Exploring the positive effects of an ageing society is conducive to coping with the severe challenges posed by population ageing. In this context, tourism in an ageing society should be studied in depth from many aspects, and many methods are applicable to this (Sedgley et al., 2011).

With changing times, as far as tourism is concerned, changes in traditional concepts have gradually diversified consumption by the older population, who increasingly participate in tourism activities, thus forming a tourism market for this group with a certain scale. Leisure and tourism are important ways to improve the happiness of the older population, which is one of the important characteristics of successful population ageing (Wang and Luo, 2014). At the same time, increases in tourism consumption are occurring more rapidly, and the consumption scale is immense. Older population tourism has, thus, become an important part of the tourism industry. The development of older population tourism is an important measure in dealing with the ageing of the Chinese population. Combining tourism and the successful ageing field when studying the tourism behavior of the older population is an innovative way to explore the ageing problem from an interdisciplinary perspective. According to statistics from the Ministry of Culture and Tourism of the People's Republic of China (PRC, 2019), older adult tourists represent about 30% of all tourists. Xia (2015) showed that the older population are most attentive to the scenery when they travel, followed by cost, traffic, and, finally, local safety. Their tourism finances generally depend on their savings, and they rarely rely on other sources of support. Further, the older population mainly derive information about older population tourism from family members and friends, followed by advertising from television networks and travel agencies. In tour groups, tour guides make arrangements for transportation, board, and lodging and provide tourism services to the older population (Hu, 2022). The main hindrances to their travel are their physical condition and age (Xia, 2015). Moreover, the older population generally believe that their happiness will be greatly improved after travelling.

Most recent studies have focused on the older population's health tourism (Wang and Luo, 2014; Chen et al., 2022). The older population can choose from a variety of tourism methods, such as overseas travel, high-end cruise vacation, and customized tourism (Hu, 2022). The form and content of their tourism choices are becoming increasingly diverse. Furthermore, the older population's motivations are different, and the relevant study results are different (Wang, 2022). Medical and health tourists can also receive medical services while touring (Chen et al., 2022). The main purpose of health and wellness tourism is maintaining or enhancing physical health, while nourishing their minds; meanwhile, nature tourists typically pursue spiritual relaxation or mental health, expanding their vision and connecting better with the spiritual realm (Chen et al., 2022). Although previous studies have discussed the motivation for the older population to choose tourism in terms of health (Song, 2021), culture (Huang et al., 2021), and the economy (Gu and Wu, 2003), few studies have systematically reviewed the tourism motivation of the older population. The development of older population tourism in China is still relatively slow, clearly lagging in terms of the needs of older tourists. The overall promotion and coordinated development of Chinese older population tourism are imperative. At the same time, studying the development of ageing tourism not only serves to explore and enrich the older tourism industry but also provides relevant guidance and support for the current development of the older population tourism industry in China.

Therefore, the purpose of the present study was to systematically summarize the current situation and factors influencing tourism in the older population, confirm the motivations that affect the older population's participation in tourism activities, and propose feasible suggestions for standardization of the older population tourism market. The results will provide a reference for the development and implementation of older population tourism.

Materials and methods

Various keyword searches were conducted using a range of both English and Chinese publications. We used 'old population tourism', 'tourism motivation', 'culture influence', 'travel behavior', 'tourism experience', and 'tourism products' as the subject words in Chinese and English retrieval. To retrieve English articles, PubMed, Web of Science, MEDLINE, and Google Scholar were used, and to retrieve Chinese articles, CNKI and Wanfang were used. We then integrated, analyzed, and summarized literature that met the inclusion criteria of this study.

Results

Characteristics of tourism in the older population

During retirement, the older population develop certain economic foundations and abundant leisure time, making the concept of enjoying life increasingly popular. Nimrod's (Nimrod, 2008) study shows that tourism plays a central role in the post-retirement reality. Active travel has become an important way for older adults to improve their quality of life; it is also becoming a common leisure and entertainment activity, as well as a common lifestyle for the older population (Wang and Luo, 2014). A survey showed that the older population tourism market has huge market potential, with considerable expansion space and development prospects. At the same time, the cost of older population tourism showed a continuous growth trend (Figure 2). Previous studies have shown that compared with younger people, the older population tend to take shorter trips, are more interested in walking, and travel less frequently (Böcker et al., 2017). Moreover, the older population is a special group. Among the older population, the process of tourism involves quality of life and consumption ability. Tourism is both physically and psychologically different for them compared to the general population, so tourism services should be offered in line with the characteristics of the older population. Moreover, retirement may affect the older population's travel plans as they may take care of their grandchildren, engage in volunteer work, or have family responsibilities (Mifsuda et al., 2017). We must note that physical decline with ageing may also lead to a decline in life satisfaction for older adults, which can affect their travel plans. These hindrances to travel may be further exacerbated by the traditional culture of China.

Due to the influence of the one-child policy, many older populations have superior material living conditions but are more likely to feel lonely because their children must work. Many older populations choose to travel to enrich their spare time and feel mentally satisfied. In the process of travelling, they can enjoy natural sceneries, broaden their horizons, increase their knowledge, enjoy life, and eliminate the loneliness caused by the desolation of their family (Zhao et al., 2013). At the same time, because most older populations are retired and stay at home, they have a lot of flexibility in deciding when to travel (Liu et al., 2021).

The older population are also prone to nostalgia and prefer tourism environments conducive to physical and mental health (Zhang and Li, 2009). Moreover, they like to stay away from the hustle and bustle of the city and prefer quiet and beautiful landscapes. In addition, the older population are deeply influenced by Chinese history and traditional culture, which they have a deep understanding of, and have a special homesickness complex. Red

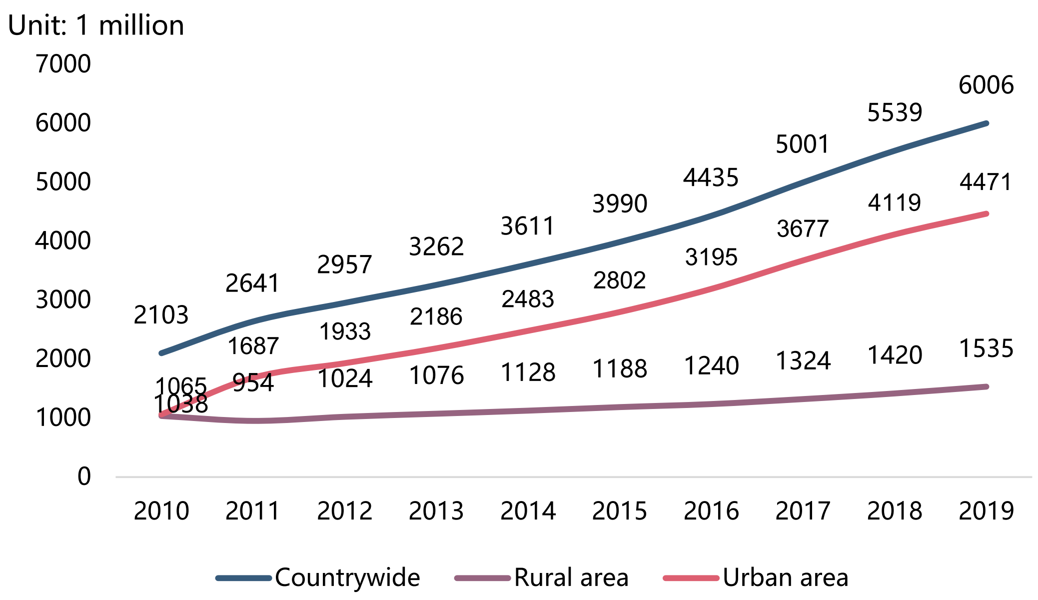

FIGURE 2
Domestic tourists in China. Data compiled by National Bureau of Statistics of China (2021).

nostalgia (a fondness for reminders of communist history in historically communist countries like China), landscape scenery, and health care travel have become the preferred travel modes for the older population (Zhang and Li, 2009). Currently, travel among the older population tends to be more diversified than before.

According to a previous study's results, income level, offspring's attitude, scenic environment, medical facilities, climate environment, and education level have a significant positive impact on the older population's willingness to travel (Zhang et al., 2021). Meanwhile, age, family structure, and health status have significant negative effects (Zhang et al., 2021). Therefore, it is very important to actively guide the older population's children to pay attention to how the older population live while ageing and provide support for their tourism pension activities in terms of encouragement and capital. The life cycle not only affects the travel obstacles perceived by the elderly, but also affects the attitude of the elderly toward travel, destination selection decisions, and travel activities. Therefore, it is necessary to subdivide the elderly leisure market regarding generation and life cycle (Chen and Shoemaker, 2014). Moreover, given that older population tourism may be seen as an unnecessary luxury, it is important to alter negative perceptions around the idea of using pensions for tourism and to improve publicity in this regard.

Influence of culture on tourism in the older population

Previous research shows that asymmetric and nonlinear effects have been observed in the development of tourism in most destination countries (Lee et al., 2022). Some researchers suggested that, based on a sense of belonging and identity, people are more likely to accept familiar cultural programs (Pastina and Straubhaar, 2005). Due to the influence of their traditional culture which can be traced back to ancient times, Chinese people have a special attachment to their home, which can also be traced back to ancient times. Therefore, when there is a large travel distance between the departure site and destination, tourists' perception of the destination is affected by cultural proximity and the physical environment (Pastina and Straubhaar, 2005). Especially due to the impact of COVID-19 and the development of social networking culture, accessing tourism resources has become more difficult for the older population. It is particularly important to improve tourism operators' quality of catering to the older population, as well as their education and training in basic medical knowledge.

In addition, because of the development of the Internet, traditional tourism advertising has been migrating to online platforms. However, the older population have difficulty understanding how to use the Internet and cannot effectively obtain some tourism information. Jalilvand et al. (2012) showed that there was a significant connection between destination image and tourism intention, so older tourists may limit their tourism destination options because they have no clear impression of certain destinations. It is, therefore, necessary to help them make full use of the Internet (based on regional cooperation and industrial integration), adjust the mode of industrial development, improve the quality of tourism human resources, and comprehensively intensify the scale and benefits of the development of tourism in the older population (Guan et al., 2022).

Broader cultural factors influence tourism-related decisions. Different evaluation dimensions of culture will produce different results. For example, a large cultural distance is more likely to bring new experiences to tourists (Huang et al., 2021). In addition, a previous study in Japan suggests that an optimal point of the cultural, administrative, geographic, and economic distance for purchasing behavior of tourists exists (Li and Katsumata, 2019). The opportunities for the older population to travel are greatly affected by the fact that the national culture and needs of elderly tourists vary across countries; the higher the income and the longer the leisure time, the stronger the desire to travel (Huang et al., 2021). Therefore, the older population have the desire and ability to travel when they have both time and money. At the same time, because the incomes of most of the older population do not increase significantly after retirement, they mostly tend to choose domestic destinations and package tours (Javalgi et al., 1992). Older populations with higher incomes and in higher social positions are more likely to buy tourism products and travel to show their achievements and meet their demand for status. Under the influence of culture, the older population pay more attention to satisfaction of diversity and enjoyable experiences and are more inclined to travel to meet the needs of rest, relaxation, self-improvement, and increased life experience (Huang et al., 2021).

Policy support for tourism in the older population

According to the State Council of the PRC:

The 14th five-year plan and the outline of the long-term goals for 2035, we should aim to improve the modern cultural system, further develop public tourism and wisdom tourism, innovate the tourism product system, improve the tourism consumption experience, strengthen the integration of regional tourism brands and services, promote red tourism, cultural heritage tourism, innovative development of tourism performance, etc., and improve the quality of vacation and leisure, rural tourism, and other services. Additionally, it is necessary to improve tourism infrastructure and distribution systems, establish tourism service quality evaluation systems, and standardize online tourism management services (The State Council of the PRC, 2021).

Many relevant measures have been introduced across many local governments to promote tourism for the older population. For example, strengthening the supply of cultural services for the older population; in-depth implementation of basic aged care services in the older population; and medical treatment, tourism, cultural activities, leisure, transportation, going out, and so forth, have been written into the 14th five-year plan for the development of the elderly cause and the older population care service system by Guizhou Province (Gazette of Guizhou Provincial People's Government, 2022). Beijing has established the 'Beijing Smart Tourism Map' and explored a new mode of elderly service. Beijing has also adopted a cultural tourism reception base for the elderly. This guides the older population in understanding the environmental conditions of scenic spots, so that they explore and compare tourist attractions and red scenic spots without leaving home as a reference for the next step towards travel (Beijing Municipal Bureau of Culture and Tourism, 2022). The Shanghai Municipal People's Government proposes that to promote tourism development among the older population, their tourism should be considered an important part of tourism overall. Red tourism, cruise tourism, health tourism, and other tourism formats suitable for the older population should be vigorously developed. Additionally, it is necessary to develop more tourism products suitable for the older population online and offline and create a characteristic tourism model. The municipal government aims to eliminate barriers and strengthen the management of tourism infrastructure, such as scenic spots and hotels, improve the level of humanized services, and create a safe and convenient tourism environment for the older population. They further aim to support tourism enterprises to actively improve the standards of tourism products and services for the older population (Shanghai Municipal People's Government, 2020). According to the official website of the Tianjin Municipal People's Government, they plan to make full use of the Centre of Tianjin Tourism's new media data and the consulting network of Tianjin tourism, as well as Weibo and WeChat, to carry out online and offline interactive marketing and shape the tourism brand of the Beijing-Tianjin-Hebei region. They will promote the greater integration of the health industry and tourism. In view of the new demands of health tourism, such as health preservation, ageing care, and healthy ageing, they will vigorously develop traditional Chinese medicine health tourism, continue to promote health tourism projects featuring traditional Chinese medicine, strengthen the management and guidance of the construction of a traditional Chinese medicine health tourism demonstration base, and explore an innovative mechanism for the integrated development of traditional Chinese medicine tourism. At the same time, they will implement a preferential policy of reducing or exempting ticket prices for the older population (Tianjin Municipal People's Government, 2020).

According to Zhou (2010), the older population have both the demand for travelling and the financial ability to meet this demand. Thus, the demand for older population tourism is strong. Therefore, with increased ageing, the older population tourism industry has begun to be favored by increasing numbers of the older population (Li and Li, 2022). Older population tourism needs not only the intelligent development of enterprises but also the strong support of local governments.

Challenges of tourism in the older population

First, supply and demand within the older population tourism market do not match, and there are even some disjointed situations. The design and arrangement of some tourism products provided by tourism agencies are not scientific and reasonable enough to take the characteristics of the older population into account (Zhou, 2010). The products are insufficiently developed, and service quantity cannot meet market demand. Despite these issues, the older population hope to obtain high-quality tourism experiences. The mismatch between supply and demand is a result of the contradiction between the pursuit of physical and mental health for the older population and the pursuit of economic interests of tourism enterprises. However, in the current tourism market of China, tourism enterprises have not put forward enough special health tourism products targeting the older population, the service quality is mixed, and market satisfaction is generally not high. As a result, it is difficult to integrate the tourism products that have been developed with the older population. The older population have certain economic advantages and relatively large amounts of free time. However, influenced by Chinese culture, they have developed habits of diligence and thrift. In terms of tourism consumption, most of them primarily choose economic tourism, tending to be practical and rational. Moreover, the older population have relatively high requirements for safety assurance and service quality in the overall tourism process, while the overall tourism market for the older population is relatively homogeneous. The available tourism products are similar in content and few in quantity, which lacks attractiveness for the older population. Tourism companies see the potential of the older population tourism market, but the risk is large. Some tourism companies even use exaggerated publicity to attract the older population while increasing self-payment projects in the process so that older tourists feel cheated. Such behavior will seriously disrupt the normal tourism market. Therefore, the development of the older population tourism market needs not only the participation of tourism companies, but also the standardized management and guidance of relevant departments (Zhou, 2010).

Second, the 'sunset red tour', 'silver hair tour', 'filial piety to parent's tour', and other tourism projects active in the China tourism market in recent years have increasingly attracted attention to older population tourism. However, they also have some drawbacks, such as difficulty in transportation transfer, managing the different needs of the older population with different cultural interests, nutrition matching of different dietary habits, differences in consumption levels, as well as the lack of carefully thought-out scenic spots and times for activities. All of these have an influence on the older population's tourism experience (Song, 2021). Although the older population's demand for tourism has been increasing, the response of travel agencies has not been warm. This is often closely related to the above reasons. Due to the influence of their generation's cultural background, the older population in the current period pay more attention to health preservation, health care, medical treatment, visiting relatives, making friends, visiting friends, and so forth (Hu and Li, 2022). Younger people travel to mountainous and rural areas to create memories that they can reminisce about in their later years and, in these later years, they hope to visit the cities that they had once worked in again. Moreover, many older populations hope to experience the red culture, accept the edification of red culture, walk the path of revolutionary martyrs again, and experience the hard-won fruits of revolution.

Third, with increasing age, the physical and physiological functioning of the older population changes and vision, hearing, and touch also gradually deteriorate. For example, slow response times, poor physical flexibility, hyposthenia, nervous system degradation, anorexia, weight loss, and memory loss begin to appear (MacIntosh et al., 2000; McLean and Le Couteur, 2004; Robbins et al., 2019). Psychologically, the older population have a lower ability to accept new things and are prone to feel inferior, lonely, and lost; they are also prone to fear, anxiety, depression, sensitivity, and stubbornness (Robbins et al., 2019).

Finally, in recent years, due to its rapid development, the Internet has been widely used in entertainment, social networking, medical care, and other fields, affecting all aspects of society. A study has shown that Internet use by the middle-aged and older population is an important factor affecting their happiness in life (Wen and Ding, 2022). Therefore, middle-aged and older populations are actively encouraged to develop Internet skills, which can enrich their social, entertainment, cultural and medical life, as well as other areas of their lives. Further, this could improve their relationships with their offspring, relieve their anxiety and depression, and improve their physical and mental health. However, the Internet is a new thing for the older population. Due to their cultural background, there is no suitable learning path for them, which creates many difficulties in the popularization of the Internet.

To sum up, the older population's tourism is affected by many factors, such as travel expense, physical condition, the length and distance of a trip, and cultural influence. In the future, older population tourism should not only focus on the development and innovation of tourism products, but sociological factors, such as culture and education, will also need to be researched. Furthermore, it is necessary to study how physiological and psychological characteristics affect the older population's tourism motivation.

Proposals for the older population tourism industry in China

Tourism consumption behavior is an unconventional, comprehensive, and experiential behavior that is different from general consumer behavior and is extremely susceptible to external factors. Huang and Cui (1994) regarded household tourism behavior as a high-level consumption behavior within the scope of spiritual and cultural consumption. With increases in discretionary funds, the older population's attitudes to consumption have also begun to change, being no longer 'behind the times', no longer satisfied with basic material necessities, but eager for more colorful leisure and entertainment activities. They are willing to go out to experience nature, visit relatives and friends, travel around, and gain spiritual pleasure while acquiring knowledge. Hence, we propose the following suggestions for the development of older population tourism in the present study.

First, we recommend developing multi-level, diversified, and high-quality tourism products for the older population that consider their physiological and psychological characteristics to meet their needs in a deeper and more detailed way. A tourism brand for the older population should be built and distinctive tourism service modes, such as cultural, landscape, and health tourism, should be introduced to induce potential demand in the older population. At the same time, the older population are likely to feel lonely because of the deaths of their friends. Therefore, older population tourism should not only focus on the older population but also introduce a tourism mode that is suitable for their offspring to travel with them, thus increasing the amount of time that older population spend with their families.

Second, the design of tourism products should reasonably plan the tourism route, combine long-distance tourism with short-distance tourism, integrate tourism resources to suit the needs of the older population in their province from their own perspective, and create a themed tourism route combining health and care. The travel period should not be too long, slow down the pace of tourism, and pay attention to safety and tourism services. Tourism products should be effectively communicated to older population, and service quality should be improved according to the travel experience of and feedback from older tourists. At the same time, targeted training should be provided to older population tourism practitioners on issues related to the older population, such as physiological and psychological changes and nutritional input, to improve humanized services and enable the older population to have better experiences and happiness through tourism. In addition, publicity should consider the characteristics of the older population when tourism products are developed and try to use eye-catching words and colorful patterns. We recommend making full use of the rapid development of 'Internet +', adopting online and offline publicity modes, and making good use of traditional publicity methods, such as radio, television, and newspapers, to attract more older tourists. We also recommend actively developing practical and easy-to-use tourism apps according to the special requirements of the older population, which could comprehensively add regional culture, local characteristics, customs, and folkways to create a brand-new older population tourism platform and service products. At the same time, in combination with relevant information from medical institutions, to ensure their safe travel, timely and effective emergency services can be provided for the older population should the need arise (Li et al., 2020). Moreover, this should be combined with national preferential policies, and a series of tourism products should be designed that conform to the needs of the older population, depending on personal hobbies, nostalgia, homesickness complex, health care, cultural experiences, and so on. Then, the older population should be informed of the related tourism details with pictures and videos that cater to their abilities before travel begins.

Finally, older population tourism needs support and supervision from the government to create a good travel environment, have a clear plan for older population tourism, clarify the development direction and orientation of the older population tourism market, establish a sound social welfare system for the older population, and introduce relevant preferential policies for older tourists. Due to the influence of traditional Chinese culture, the older population mostly adhere to values of diligence and thrift. Therefore, traditional cultural values also hinder the older population from travelling. However, in the present era, the world has begun to move closer to integration of Chinese and Western cultures. Affected by this, many older populations have begun to use tourism to enrich their experience. Most older populations have a strong willingness to participate in leisure activities and are willing to invest their money, time, and energy in improving their sports skills and activity participation (Long and Wang, 2013). According to the local tourism situation and the characteristics of the older population's economic resources for travel, preferential policies for off-season tourism can be introduced to stimulate the older population's tourism motivation so that their tourism experience meets their expectations (Luo and Li, 2021). At the same time, they should improve the software and hardware facilities of older population tourism, such as barrier free thoroughfares and barrier free equipment construction at various scenic spots, hotels, restaurants, and toilets, to create a good tourism atmosphere for older population tourism. In addition, while developing, opening up, and supporting older population tourism, all government departments should play a leadership role, strengthen the supervision of older population tourism enterprises, effectively safeguard the legitimate rights and interests of older tourists, and improve their tourism experience and happiness index.

Discussion

The acceleration of the aging of society has had a wide impact on society in general, the economy, and culture (Huang and Chen, 1999). In recent years, with the improvement of the older population's economic and health levels, they are eager to obtain a more meaningful elderly life, including participating in tourism and receiving life-long education (Wen and Ding, 2022). In this regard, tourism has become one of the important ways to enrich the lives of the older Chinese population (Wang et al., 2017). The older population pay more attention to enjoying the scenery when they travel, followed by cost, traffic, and, finally, local safety. However, the older population mainly derive tourism information from family members and friends, followed by advertisements by TV networks and tourism agencies. Most older populations choose to travel in groups, and the main factors that hinder tourism in older populations are their physical condition and age (Xia, 2015). Therefore, in designing tourism products for the older population, their particular needs should be fully considered and tourism routes should be designed according to local characteristics, natural scenery, and different cultural characteristics. Additionally, effective publicity should be carried out using a combination of both online and offline modes and the training of older population tourism practitioners should be strengthened to improve the older population's tourism experiences. Furthermore, emergency care and safety for the older tourism population should be guaranteed.

Moreover, culture has a great impact on tourism among the older population. Influenced by their traditional culture, Chinese people, especially the older population, have long had a special attachment to their home. Cultural differences within China also produce different results (Gu and Wu, 2003). Therefore, tourism products for the older population that consider this background can still be further developed. Through tourism, the older population can not only deepen communication and exchange with their offspring, but also achieve the goals of rest and relaxation. Thus, the tourism experience of the older population can be improved. Moreover, the impact of the rapid development of the networking culture on the older population should not be ignored. Helping them to learn relevant knowledge and operating skills can also effectively improve how they obtain tourism information. Older population tourism practitioners should realize that tourism consumption behavior is different from ordinary consumption behavior and, therefore, satisfy the needs of the older population in a more in-depth and comprehensive way.

The development of tourism for the older population cannot be separated from support by state and local governments. From the state level to all local governments, many relevant measures for the older population have been introduced. These will promote older population care service systems that integrate ageing services, medical care, tourism, cultural activities, and leisure.

However, the older population tourism industry also faces many challenges, such as unbalanced supply and demand, the unreasonable design and arrangement of tourism products, and that the characteristics of the older population are not taken into consideration (Zhou, 2010). Furthermore, service quality does not conform to market demand. Existing tourism products are not attractive to the older population, as most of them are similar in content, and their numbers are insufficient, so the service quality cannot be guaranteed, which reduces the older population's tourism experience. In addition, the influence of age and cultural background on the older population cannot be ignored. To a certain extent, the older population also have a need to rekindle previous memories and visit their relatives and friends. Therefore, older population tourism design should also fully consider these needs. Although the demand for older population tourism has risen in recent years, the response of tourism agencies has not been enthusiastic. The reasons are often closely related to the aforementioned factors.

The present study discusses the motivational and influencing factors of older population tourism and proposes some suggestions based on these factors. In the future, there are still many issues to be discussed, for example, the impact of ethnic differences and how education affects older population tourism. Further research on older population tourism is particularly important in healthy ageing.

Conclusion

There are still many problems in tourism for the older population. In China, older population tourism to learn, eventually pursue life of continuity and respect, and discover the changes of country with a high sense of pride and patriotism exist (Hsu et al., 2007). It is necessary to consider personal factors, such as physical functioning and health condition, as well as social factors such as culture, habits, and safety when developing and designing tourism products. In addition, when designing and propagating tourism products, we need to conform to the needs and characteristics of the older population. We also require guidance, assistance, and support from different levels of government.

Author contributions

JT: writing original draft. SH and CY: supervision. RD and MT: conceptualization. ZX: methodology. YP: investigation. YL: investigation and methodology. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Evaluating the impact of employees' perception of identity threat on knowledge sharing behavior during COVID-19: The mediation and moderation effect of social capital and reward system

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Quarantine policies introduced in the context of COVID-19 are affecting business operations and slowing down the flow rate of the overall economy. Different degrees and types of threats occur in both the living environment and the working environment during the epidemic prevention, which causes many additional uncertainties. The impact on employees is the identity threat from environment and organizations. This is different from the related research on the identification and impact of the threat before the occurrence of COVID-19. However, in the post-pandemic period, companies continue to strengthen important factors that can increase innovation and recovery, including the role of employee knowledge sharing. The organizational inequity and lack of organizational justice bring about the threat of internal identification in organizations. In order to ensure their own interests in organizations, employees may think twice when sharing knowledge. Therefore, this study explores the relationship among employees' identity threat, social capital and knowledge sharing behavior from the perspective of organizational behavior. In this study, a sample of high-tech employees was conducted, and a total of 434 questionnaires were obtained. The research results show that employees' perception of identity threat has a negative impact on knowledge sharing behavior and positively affects social capital; employees' social capital positively affects their knowledge sharing behaviors; and organizational reward system moderates the relationship between identity threat and knowledge sharing behavior. Based on the comprehensive research findings, this research proposes corresponding theoretical and practical implications.

KEYWORDS

identity threat, knowledge sharing, social capital, reward system, high-tech

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Introduction

COVID-19 has been a widely concerned issue for a long time. In recent years, COVID-19 has greatly changed the economy, education, society and business of the human beings, followed by many new life and management modes (Lee et al., 2021; Cao et al., 2022; Zhao et al., 2022). Organizations and firms want to increase employees' adaptability to changed environment and enhance their efforts made to organizations through the establishment of appropriate policies and schemes (Zhao et al., 2022). However, the environmental changes also cause constant increase of employees' sensitivity to uncertainties and threats in the changed environment. In addition to threats to health from external environment, there are also threats from colleagues. In the business context affected by the COVID-19 pandemic, business opportunities and growth conditions also suffered enormous changes apart from the business competition environment (Peng et al., 2022). In particular, organizational innovation and knowledge innovation are the sources of competitive edges, which makes organizations attach more emphasis on employees' innovation behaviors and knowledge innovation (Lee et al., 2021; Cao et al., 2022). However, few studies discuss the antecedent factors for knowledge sharing and innovation behaviors of employees in the context of COVID-19. Thus, this study aims to discuss the factors that affect employees' knowledge innovation and knowledge sharing behavior in the context of COVID-19.

From the perspective of competitive threats, employees often experience identity-threatening events where they are questioned or invaded (Piening et al., 2020). Examples include questioning about their working competence or unfair evaluation of working performance from colleagues (McCord et al., 2018). These events will cause mental or emotional discomfort of workers, and may also challenge, question or lower individual competence, dignity or perceived self-worth, which thus generates the identity threat among employees (Piening et al., 2020). Scholars believe that identity threat is common to see in organizations (Petriglieri, 2011; Hall et al., 2018) and has unfavorable outcomes for workers such as the increase of antisocial behaviors and separation (Park and Shaw, 2013; Piening et al., 2020), the decrease of involvement in organizational activities behaviors and of obedience (Zellweger et al., 2013), and the harmfulness to dignity and performance (Trinkner et al., 2019). According to the IEO model, environmental factor plays an important role in input and output, and diversified risks and threats from external environment perceived by individuals will affect the expected outcomes and output. A majority of studies of knowledge management explore positive factors in environment, but few pay attention to the effect of identity threat. Thus, as risks brought by COVID-19 become a normal state, identity threat becomes an important topic to be discussed.

In view of the generality and importance of identity threats in organizations, many conceptual literature (Petriglieri, 2011) in recent years and empirical studies (White et al., 2018; Craig et al., 2019; Hay et al., 2021) were published successively. Petriglieri (2011) is the first scholar who proposed the identity-threatening process and the response theory model, arguing that identity threat is an evaluation outcome based on individual's subjective cognition against objective events. Many subsequent empirical studies were also carried out by reference to other theories (Conroy et al., 2017; Piening et al., 2020). However, there are few studies examining the effect of employees' perceived threats on knowledge innovation from the perspective of threats in workplace (Eisenberg and Mattarelli, 2017), so the discussion on how perceived threats lower employees' innovation and knowledge sharing behaviors will fill in the gap of the social exchange theory. Therefore, this study seeks to discuss the effect of employees' identity threat on knowledge innovation and knowledge sharing.

Knowledge sharing behavior is not only influenced by personal motivation, but also by knowledge sharing opportunities. Knowledge sharing behavior refers to the knowledge transfer across individuals and organizations, storage in and retrieval from knowledge base, and the process of behaviors becoming the routine and practices of organizations (Hassan et al., 2016). In addition to knowledge sharing, Lailin and Gang (2016) pointed out that knowledge transfer can promote the continuous updating and value-added of employees' knowledge structure. Employees' knowledge transfer is not only a process of knowledge transfer and exchange, but also a complete process of knowledge selection, assimilation, integration and application (Zhao et al., 2021). If there is no strong connection between the two, there will be a disjointing phenomenon of "the superior has policy, the inferior has countermeasure." This phenomenon is more obvious especially in the Chinese society that attaches great importance to interpersonal relationships. Interpersonal relationships can promote formal and informal interaction among employees, exchange subject knowledge and effective resources, bring effective changes to personal knowledge development, and accumulate employees' social capital in organizations (Ho and Peng, 2016; Chen et al., 2020). Empirical research by Hu and Randel (2014) shows that social capital is an important factor affecting knowledge sharing behavior of members; Hau et al. (2013) studied the structure of social capital and found that social capital at the structural, relational or cognitive level has a positive effect on individuals' knowledge sharing behavior. However, this study focuses on whether the social capital can improve employees' knowledge sharing and innovation behaviors through lowering the impact of identity threats. Therefore, this study believes that exploring the mediating effect of employees' social capital should be of considerable importance and research value to clarify the relationship among identity threat, knowledge transfer and knowledge sharing.

As indicated in many studies of social psychology, there are several influence factors among intention and behavioral performance, leading to inconsistent outcomes caused by prediction of behavioral performance based on intention. There is also a research gap in this topic in the management field. Shneor and Munim (2019) suggested that moderating factors can be discussed based on empirical situations in behavioral studies.

Although interference variables for innovation behaviors at the individual level were proposed in previous studies, only interference mechanisms related to "leadership" were discussed (Lei et al., 2019). By reference to literature in the service management field, this study puts forward an moderating mechanism, i.e., incentive system (Wei and Atuahene-Gima, 2009; Park and Yang, 2019). This study attempts to clarify whether the design of incentive systems can lead to different knowledge sharing behaviors in the job context.

According to above arguments, this study makes the following research contributions: (1) applying the social exchange theory to discuss perceived threats and risks generated by COVID-19, and discussing the effect of identity threat; (2) verifying the development process of social capital and knowledge sharing when employees perceive external threats and risks; (3) Introducing the concept of positive reward system from social exchange theory to discuss the moderating effect of reward system among identity threat and knowledge sharing.

Literature review

Process and response theory models for identity threat

Many scholars claim that self-identity includes personal attributes and social identities (Amiot et al., 2007). Personal attributes refer to dimensions related to sense of self, such as individual talent or capabilities; social identities refer to dimensions related to social groups where individuals belong to, such as gender or race. Since self-identity reflects self-worth, significance and evaluation, people will make efforts to maintain the positive self-identity (Jones and Volpe, 2011). When individuals perceive challenges from negative events, or raise questions about their positive self-concept (e.g., capabilities or self-worth), they will perceive that their representations or manifestations are restricted or hindered. In this case, individuals will experience self-identity threat (Yang and Konrad, 2011; Walker et al., 2017). Petriglieri (2011) described the action process of identity threat, but did not have a specific description of associations between two cognitive evaluation stages (i.e., primary evaluation and secondary evaluation) of individuals, especially how individuals affect individual outcomes (e.g., manifestation of job behaviors that are favorable to organizations) through secondary evaluation after the primary evaluation is completed. This requires further empirical studies (Brown and Coupland, 2015). As stated by the social exchange theory, exchange activities between organizations and employees will be affected by multiple external environmental factors, but identity threats may change norms, beliefs and sense of identity formed during interaction and further weakens employees' exchange behaviors (Lin et al., 2020; Luo et al., 2021; Su et al., 2021). Prior studies mostly discussed employees' innovation and knowledge sharing behaviors using the social exchange theory, and emphasized the effect of a variety of organizational and individual factors (Lin et al., 2020; Luo et al., 2021). But few studies have examined the identity threats of environmental factors (Su et al., 2021). Thus, this study intends to further fill in the gap in evaluation connotation of the identity threat process based on Petriglieri's theoretical views. Besides, this study contends that employees facing identity-threatening events will not only conduct the primary evaluation for identity threats, but also conduct secondary evaluation according to the current environment so as to check whether the environment offers security assurance (Horton et al., 2014), enables them to constantly show self-identity, and uses self-identity as a basis for subsequent job behaviors. Combined with Petriglieri's theoretical views and social exchange theory, we further discussed the correlation of identity threats with employees' knowledge sharing behaviors.

Petriglieri (2011) argued that it is easy to produce identity threats if negative events experienced by individuals feature identity importance or experience recurrence (Brown and Coupland, 2015). Identity importance means that these negative events are closely associated with self-concept, and also generally involves individuals' capabilities or self-worth. Examples include colleagues' depreciation on capabilities or judgement on decisions. Since individuals often pay close attention to aspects related to self, they tend to highly perceive these negative events (Conroy et al., 2017). Experience recurrence refers to the repetition or constant occurrence of these negative events. Employees will perceive a high level of identity threats if they experience repeated challenges or doubts on their experience. Identity threats derive from employees' subjective evaluation of negative events in workplaces (Petriglieri, 2011; Horton et al., 2014). Individuals are experiencing identity threat when individuals recognize that external negative events are likely to play down self-worth, capabilities or dignity, or dim the significance of self-identity and affect the development and continuation of self-identity (Brown and Coupland, 2015; Spyridonidis et al., 2015).

Knowledge sharing

In addition, knowledge sharing is one of the most important behaviors in knowledge-related behaviors. As a necessary link for the transformation of individual knowledge into organizational knowledge, it can effectively enhance the ability to absorb and innovate. It is also a prerequisite for knowledge creation, and plays a key and indispensable role in the application and integration of organizational knowledge (Foss et al., 2010; Foss and Pedersen, 2019; Ritala and Stefan, 2021). Hansen (1999) defines knowledge sharing as the acceptance and provision of work-related information, expertise, experience or advice by members. From the perspective of motivation orientation, the motivation to help others is related to knowledge sharing behavior, while extrinsic and intrinsic motivation have a significant impact on knowledge sharing intention (Olaisen and Revang, 2017; Foss and Pedersen, 2019; Ganguly et al., 2019; Yong et al., 2020). Among them, motivation can enhance members' perceived benefits of knowledge contribution, which in turn drives knowledge sharing. In addition, not only knowledge sharing motivation will affect the sharing of knowledge and experience, but knowledge sharing opportunities will also enhance the occurrence of sharing behavior (Foss and Pedersen, 2019; Ganguly et al., 2019; Zhao et al., 2021). Lilleoere and Hansen (2011) mentioned that members' perception of sharing opportunities will affect knowledge sharing within the organization. When sharers generate knowledge sharing opportunities based on social relationships, the possible risks and costs of sharing knowledge will be reduced, thereby promoting knowledge sharing behavior (Anwar et al., 2019). Especially when individuals feel that they have convenient sharing channels, it will increase their willingness to share knowledge (Gagné et al., 2019).

There are two opposite views on knowledge sharing in previous studies. Al-Kurdi et al. (2020) believed that knowledge is the source of power, so knowledge sharing may weaken the individual's dominant position in organizations. Pereira and Mohiya (2021) argued that knowledge sharing may cause the loss of competitive edges. On the contrary, Muhammed and Zaim (2020) pointed out that individuals who share knowledge can acquire more knowledge from the feedback from and discussion with knowledge receivers. Park and Kim (2018) contended that knowledge sharing is not only a process of learning, but also a process of helping others improve capabilities. Individuals who master knowledge caught in a dilemma about knowledge sharing because the two opposite outcomes. From the individual perspective, employees considered knowledge sharing as a threat, and are willing to share their knowledge only if there are equivalent interests for exchange (Park and Kim, 2018). However, employees will reduce or stop knowledge sharing when they recognize that knowledge sharing may cause the loss of competitive edges or may lead to unfairness (Pradhan et al., 2019). Thus, this study proposes a hypothesis as follows:

> *H1*: Identity threat has a negative impact on knowledge sharing behavior.

Social capital

Previous studies considered knowledge governance to be an important antecedent factor in the process of knowledge integration (Foss, 2007), but ignored the social relationship aspect in the process of knowledge integration. The research of Gooderham et al. (2011) and Pemsel et al. (2016) began to focus on the social relationship level of knowledge governance (for example, the social capital among members), and found that informal governance is more effective than formal governance. Ganguly et al. (2019) stated that social capital is the sum of potential and actual resources embedded in, derived from, or available from relational networks. Edinger and Edinger (2018) further interpret social capital in a team as all the resources that can be provided to the team through members' relationships in the team's social structure and under the broader social structure of formal and informal organizations (Alghababsheh and Gallear, 2020; Zhou et al., 2021). Therefore, the social capital of the team must be examined in a broader organizational context, and a team will have more social capital "liquidity" because of the status of its members in the entire social structure, which means that when the team needs certain resources, members can quickly and effectively use their social connections to deliver certain resources (Alghababsheh and Gallear, 2020). Most of the studies measure social capital from the relational dimension (Zaheer and Bell, 2005; Cai et al., 2011) and structural dimension (Dhanaraj et al., 2004; Moran, 2005; Pinho and Prange, 2016; De Luca et al., 2018; Chowdhury et al., 2020). In order to understand the influences of the network structures in SMEs on their overseas market performances, this study argues that as one dimension can not fully depict the profile of information and knowledge acquired from networks by SMEs (Gilsing and Duysters, 2008), so network range and network strength should be used as dimensions to present the completeness of information and knowledge benefits provided by network structure.

As argued by Petriglieri (2011), individuals are experiencing identity threats when they conclude through the primary evaluation that negative events are of high self-relevance and may cause experience reoccurrence (Brown and Coupland, 2015). With such a state of mind, individuals can perceive that their capabilities, dignity and self-worth are questioned and challenged. Prior studies also concluded that individuals have a strong driving force to protect self-concept (Amiot et al., 2007; Jones and Volpe, 2011). In this case, individuals will carry out secondary evaluation to decide measures that can reduce the harm brought by threats. As shown in this study, social capital, as the specific connotation of secondary evaluation, will facilitate individuals to seek for interpersonal relationship that can reduce threats and provide sense of safety from their social network before making decisions on subsequent behaviors (Chiu et al., 2015), because of their experience on identity threats deriving from external environment (Jones and Volpe, 2011). Thus, this study proposes a hypothesis as follows: As a result, individuals who perceive identity threats from external negative events may have a subjective evaluation that their job environment are harmful because they have found differences between external ego (negative self-concept perception) and internal ego (positive self-concept recognition); for example, individuals may perceive the unkind comments from the external environment or doubts on their capabilities and self-worth (Vardaman et al., 2018). They become sensitive to environmental cues, and are willing to truly express themselves during interaction in social relationships, which can reduce the sense of mental threats in workplaces (Tong et al., 2020). As such, employees who perceive identity threats tend to acquire more social resources and supports from social capitals so as to enhance confidence in and solutions for identifying and dealing with threats.

> *H2*: Identity threat has a positive effect on employees' social capital.

Many empirical studies have focused on the relationship between social capital and knowledge sharing (Hau et al., 2013; Hu and Randel, 2014) and found that social capital is the driving force of knowledge sharing (Liu and Meyer, 2020). From the perspective of social capital, the structure of social capital means the strength of the relationship or the frequency of interaction between an individual and other members (Sheng and Hartmann, 2019). When members have higher social capital, there will be more frequent interactions, creating sharing opportunities for members to directly contact and exchange explicit knowledge, as well as the possibility of understanding implicit knowledge (Foss and Pedersen, 2019). Therefore, the structure of social interaction can promote individuals to carry out knowledge sharing in a cost-effective way, and improve the intensity, breadth and frequency of knowledge sharing (Chiu et al., 2006; Chowdhury et al., 2020). Social capital relationships represent the quality of connection between individuals, including the degree of mutual trust or cooperation in the relationship (Bolino et al., 2002; Lin and Huang, 2022). Among them, trust based on the norm of reciprocity is the most critical factor (Le and Lei, 2018; Ganguly et al., 2019). When members have a high degree of trust, they are not only more willing to share knowledge with others, but also contain more implicit knowledge and private information (Ferraris et al., 2018; Moysidou and Hausberg, 2020). Therefore, on the one hand, based on high-quality relationships between individuals, social capital relationships are expected to encourage mutual sharing of implicit knowledge (Janowicz-Panjaitan and Noorderhaven, 2009); On the other hand, with the increase of trust, norms and cooperation in social capital relationships, it can also increase the communication opportunities of individuals and promote the sharing of explicit knowledge. Thus, this study proposes a hypothesis as follows:

> *H3*: Social capital has positive effect on knowledge sharing behavior.

Reward system

In general, incentive systems are an important tool for organizations to create psychological resources for employees (Allen and Griffeth, 2001; Chen et al., 2015). Incentive systems are job rewards given by organizations to individuals based on their performance besides salaries. Organizations also motivate employees to outdo themselves and achieve more excellent performance through incentives surpass (Malik et al., 2015; Plassmann and Weber, 2015). In the fields of knowledge sharing and organizational behaviors, rewards include financial rewards (or material rewards), and non-financial rewards. Examples of financial rewards are generally cash, stocks and other material objects, while non-financial rewards are generally symbolic rewards such as granting of titles, awarding of certificates of merit, or conferring of metals (Martono et al., 2018). The design of such reward mechanisms will affect the feeling of employees about incentive systems. Scholars in the field of organizational psychology indicated that employees have varied expectations about job outcomes due to their different social experience, leading to different recognition in incentive systems of organizations (Ngwa et al., 2019). Favorable incentive systems represent that organizations tend to recognize employees who are willing to share knowledge. The cognition of such incentive systems will affect employees' perception over identity threats, and facilitate the possibility of knowledge sharing.

Many scholars studying organizational behaviors hold that employees develop a perception of organizations' incentive systems by comparing their job engagement to returns, and adjusts future job engagement on this basis (Malik et al., 2015; Martono et al., 2018). Since the perception of incentive systems is a subjective thing, employees in the same organization may have different feeling about the same incentive system, thus affecting their enthusiasm in the course of work. In other words, employees can perceive a higher degree of fairness when they are well aware of the incentive system, thus reducing internal uncertainties and identity threats in organizations, and enhancing confidence in engaging in knowledge sharing (Plassmann and Weber, 2015; Rohim and Budhiasa, 2019). Employees with lower awareness of incentive systems believe that organizations do not value organizational citizenship behaviors of employees and lack care for employees. Thus, they have low confidence in and enthusiasm for knowledge sharing and will not be motivated to seek for opportunities to realize knowledge innovation (Mcfall et al., 2009; Ngwa et al., 2019). From another point of view, employees with lower awareness of incentive systems tend to regard their efforts in knowledge sharing as a significant sacrifice, because organizations do not give them corresponding rewards even if they devote a lot to knowledge sharing. Thus, this study proposes a hypothesis as follows:

> *H4*: Reward system negatively moderates the relationship between identity threat and knowledge sharing behavior.

According to the above hypotheses, the research framework is shown in Figure 1.

Methodology

Sampling

This study aims to understand the impact of identity threat on employees' knowledge sharing behavior. Different countries are responding and dealing with COVID-19 differently, so it is impracticable to take each country as a sample. This study collects samples from the Chinese mainland. There are many industries affected by COVID-19, and these affected industries

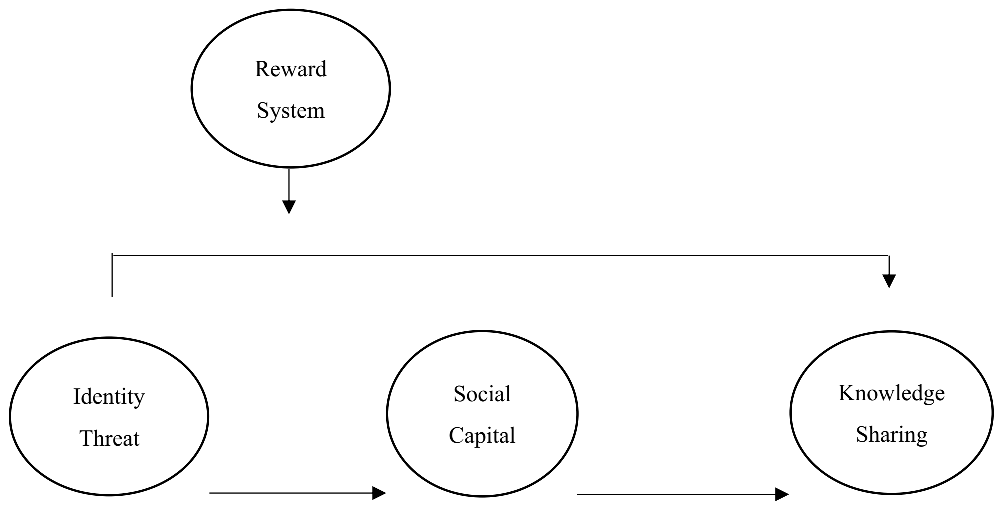

FIGURE 1
Research framework.

may have an exogenous effect on the research result, so we only used enterprises in the high-tech industry as variables to control potential discrepancies. Thus, purposive sampling is adopted, to understand employees' identity threat, it is necessary to focus on R&D employees, and the high-tech industry was adopted as the main sampling context. Since the purposive sampling may cause sampling bias, we set sampling conditions for the sampling strategy. First of all, we only distributed questionnaires to 20 high-tech industries in highly concentrated clusters of technology industries in the east coast of Chinese mainland. Second, we distributed different number of questionnaires to different companies, and conducted variation analysis for collected questionnaires to determine that research objects will mot have a significant impact on research variables. This study takes the R&D employees in the high-tech firms, excluding the staff in the administrative department, as the study population in order to accurately collect representative samples. In this study, copies of electronic questionnaire were sent, and 440 copies of questionnaire were collected. The 440 questionnaires were collected from high-tech firms, with each firm submitting 15–25 questionnaires. These questionnaires are sufficient in quantity for analysis during the structural equation modelling. 434 copies of valid questionnaire were obtained after excluding invalid 6. In the sample, most are male (73.1%), whose level of education is mostly master or above (68.4%), and most of them are between 30 and 40 years old (74.1%) with average working year of 6.3.

The period of sample collection was from August 2021 to October 2021. Scholars have proved that questionnaire replies at different time of period may cause data bias error. In order to verify the absence of sampling bias in this study, we test the scale using non-response bias, and compare the differences in variables of samples collected before and after September 2021. The results show that there are no differences in all variables.

Given that self-reporting measures may cause common method variances, this study evaluates common method variances through the following two types of statistical analysis. We analyzed the main composition factors using SPSS, and conducted Harman's single factor test (Podsakoff et al., 2003). The results of factor analysis show that seven factors have characteristic values greater than 1, with the explained variation of the first factor as 35.45%, and cumulative explained variation as 67.83%. This indicates that there is no phenomenon that one factor explains most of variabilities.

Measures

The identity threat scale is based on the identity threat developed by Aquino and Douglas et al. (2003). The measurement questionnaire contains 9 items to evaluate identity threat, such as "Judging your work in an unfair way" and "embarrassing you in front of your colleagues." The social capital scale used in this study refers to the framework of Tsai et al. (2014), modified from the scale developed by Yilmaz and Hunt (2001) and modify the relevant vocabulary according to the educational context. The measurement questionnaire contains 11 items to evaluate the three dimensions of the social capital of the employees: "relational dimension," "structural dimension" and "cognitive dimension," such as "I spent a lot of time to interact with colleagues," "I think I can count on my colleagues to do the right thing," and "Every teacher has the same cognition on school goals." The knowledge sharing scale is modified from the scale developed by Huang et al. (2013), and the relevant vocabulary is modified according to the educational context. The measurement questionnaire contains a total of 11 items to evaluate the three dimensions of teachers' knowledge sharing: "knowledge sharing motivation," "knowledge sharing opportunities," and" knowledge sharing behavior," such as

TABLE 1 Scale measurement.

	1	2	3	4	5	6
1. Identity threat						
2. Relational dimension	−0.133					
3. Structural dimension	−0.097	0.702				
4. Cognitive dimension	−0.163	0.684	0.740			
5. Knowledge sharing behavior	−0.123	0.666	0.734	0.734		
6. Reward system	−0.092	0.608	0.687	0.661	0.687	
Mean	2.898	3.789	3.635	3.701	3.671	3.533
SD	1.141	0.937	0.980	0.955	0.971	0.987
Cronbach's α	0.844	0.873	0.874	0.834	0.895	0.883
AVE	0.758	0.734	0.772	0.755	0.792	0.823
CR	0.934	0.924	0.946	0.941	0.953	0.933

TABLE 2 Indirect effect of structural model.

Paths	Std. β	Std. error	t-Value	Decision
Identity Threat → Social Capital	0.278***	0.032	4.731	Support
Identity Threat → Knowledge Sharing	−0.328**	0.046	4.200	Support
Social Capital → Knowledge Sharing	0.534***	0.063	7.832	Support
Identity Threat*Reward System→ Knowledge Sharing	−0.165*	0.022	2.132	Support

* if $p < 0.05$; ** if $p < 0.01$; *** if $p < 0.001$.

"I am willing to share my knowledge and experience with others in a more accessible manner," "I have many chances to build a good work team with other colleagues," and "I often share my knowledge and experience at meetings or in discussions." The reward system scale is modified from the scale developed by Baer et al. (2003) and Chen et al. (2015). The measurement questionnaire contains a total of 5 items to assess employees' perception of reward system.

Results

Measurement

SmartPLS 3.0 and SPSS 23.0 were used to analyze the data. Before testing the hypotheses, the validity of the instrument was evaluated using convergent validity and discriminant validity. In addition, confirmatory factor analysis (CFA) was used to evaluate the measurement model. The data test results showed that the Cronbach's α values of all the constructs were above 0.857 in Table 1. According to the study results, the reliability was significant when the Cronbach's α coefficient exceeded 0.7, which indicated that the internal consistency of each construct was high. The AVEs and CRs of all dimensions in the Table 1 are all higher than the recommended value of 0.5 and 0.8, so all the dimensions of this study has good convergence validity. In addition, divergent validity was tested by comparing the average variance extracted (AVE) for each construct with the square of correlation coefficients. AVE for each construct was greater than the square of the related correlation coefficients, indicating the divergent validity of the constructs (Table 2).

Hypothesis testing

Before the analysis, this study first analyzed the fit of the structural model (Geisser, 1974). Then, Stone–Geisser-Criterion (Q^2), coefficient of determination (R^2), and standardized root mean square residuals (SRMR) is used to assess the overall model fit. In our results, Q^2 values were above 0, all R^2 values were more significant than 0.10, and SRMR was less than 0.08, meeting the expected criteria (Götz et al., 2010). As can be seen from analysis results of the structural model, SRMR is 0.043, and NFI is 0.933; thus, a good model fit is confirmed. Furthermore, social capital's R^2 is 0.378, and knowledge sharing's R^2 is 0.437; thus, R^2 values in this study are accepted.

Figure 2 and Table 2 provide the results of testing the hypotheses. This study also tested for direct effects between the variables and derived the degree of effect. Regarding H1, the results indicate the nagetive and significant effects of identity threat ($\beta = -0.328$, $p < 0.001$) on employees' knowledge sharing behavior. So H1 was supported. Moreover, the results show that employees' perception of identity threat ($\beta = 0.278$, $p < 0.001$) has positive and significant effect on employees' social capital, which supporting H2. Similarly, employees' social capital ($\beta = 0.534$, $p < 0.001$) have positive impact on employees' knowledge sharing behavior, so H3 was confirmed. Our findings also indicate that organizational reward system ($\beta = -0.165$, $p < 0.05$) significantly moderates the relationship between identity threat and knowledge sharing behavior; thus, H4 was supported.

The interaction between identity threat and reward system is significant for knowledge sharing. To show the moderating effects between identity threat and knowledge sharing clearer, we plotted this significant interaction and indicated that identity threat significantly predicts employees' knowledge sharing only when reward system is high, as shown in the simple slope chart in Figure 3.

Conclusion

Discussion

This study extends the views of previous identity threat scholars and argues that self-related negative work events in

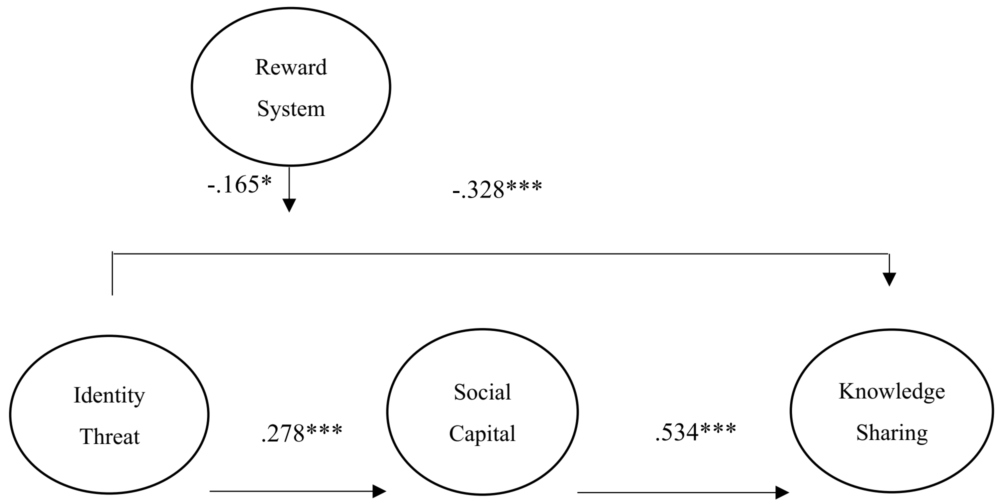

FIGURE 2
Structural model.

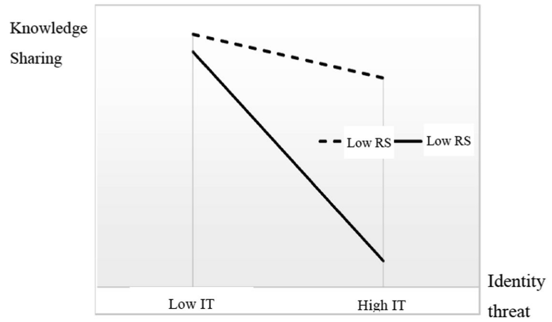

FIGURE 3
Interaction effects.

organizations can cause identity threat of workers (Aquino and Douglas, 2003; Douglas et al., 2003), affecting the performance of their work behavior. Researchers conduct empirical investigations into the psychological mechanisms and behavioral responses of identity threat in real organizational settings, which can supplement the research gap in the past laboratory research on identity threat (e.g., Davies et al., 2005) or qualitative research in a specific occupation (e.g., Elsbach and Kramer, 1996), such as the lack of external validity or the understanding of the dynamic process of personal adjustment (Elsbach, 2003). Based on Petriglieri's theoretical views and social exchange theory, we propose a verifiable conceptual framework to discuss the effect of identity threats on employees' knowledge sharing, and takes reward system and social capital as moderator and mediator, respectively. This study found that when individuals faced an identity threat event in an organization, they would experience the identity threat and evaluate the organizational situation in which they were placed, so as to examine the security degree of self-continuous presentation and determine the subsequent behavioral response. These results indicate that individuals who experience identity threat will evaluate the advantages or disadvantages of self-presentation in their situation, and then adjust their subsequent behavioral responses to avoid more threats to themselves.

This study proposes that identity threat has a negative impact on knowledge sharing behavior, but a significant positive impact on social capital. The results support the identity threat that increase the need for social capital and also reduce knowledge sharing behaviors among employees. The difference between this study and Rodionov (2021) lies that we attempt to understand whether employees will seek for more connection of external relations to reduce risks brought by identity threats when they perceive high identity threats. This study concludes that highly social support and connection can effectively threats and job insecurity arising from external environment so as to improve employees psychological stress and anxiety. This result agrees with the finding of Abbas et al. (2021). This is similar to the idea that when employees perceive a higher identity threat to the work environment and living environment, they have a distrustful attitude towards the work environment and the organization, and in order to maintain their work status and safety in the organization, they are more reluctant to provide more knowledge sharing behaviors. Ali et al. (2021) agree with this view. They indicate that employees will try to protect their knowledge and refuse to share it with other members in order to keep their competitiveness and advantages in an organization when they perceive higher external threats or job insecurity. However, when employees identify a higher degree of threat, they are more inclined to establish and maintain more diverse and close social capital. Through rich social capital, employees can obtain more information and knowledge, and provide more know-how and evaluation for the benefits and effects of knowledge sharing. Although scholars have pointed out that the higher the degree of threat identified by employees, the negative organizational citizenship behavior and the reduction of positive work behavior will be caused (Reisel et al., 2010), this study extends its research scope to positive work behaviors in organizations, and adds the mechanism of social capital to further clarify the impact of identity threat on knowledge sharing behaviors. This study can supplement Petriglieri (2011) response view of identity threat. In addition to adopting an identification-protective response to the source of the threat, or adopting an identification-reconstructing response to the threatened identification to reduce the potential harm to the identification, the results of this study found that individuals who experience identity threat may improve their judgments on identity threat through the maintenance and development of their own social capital, and then adopt appropriate behaviors to avoid the expansion of threat experience. As argued by Ali et al. (2018) and Qi and Chau (2018), employees' willingness to knowledge sharing will depend on the socialization process within organizations, and the high sense of identity with fitting in a group will help improve communication and interaction among employees. Therefore, the process of knowledge sharing among employees depends on the role of social capital, which means that the more social capital, the more it contributes to knowledge sharing behavior among employees.

Secondly, this study found that employees' social capital can mediate the negative effect of identity threat, indicating that the connectivity of social capital can be used to transform the impact of identity threat on personal psychology and behavior, thereby improving the generation of knowledge sharing behaviors. The results are similar to the arguments of Alghababsheh and Gallear (2020), Edinger and Edinger (2018) and Ganguly et al. (2019). They believed that employees' social capital is not only an important source of external knowledge, but also a factor that represents the quality of relationship maintenance and interaction among employees; the intensified social capital can strengthen the cohesion between employees and organizational members and form the embeddedness effect, contributing to the inter-information flow.

Finally, this study clarified whether reward system design could buffer the negative impact of identity threat on knowledge sharing behavior. The results showed that reward system significantly adjusted the relationship between identity threat and knowledge sharing behavior, and effectively reduced the perception of organizational injustice or violation of organizational justice principles brought about by identity threat. This result is similar to the research finding of Rohim and Budhiasa (2019), who discussed positive organizational supports and culture using the social exchange theory and found that reward systems can motivate employees to improve their knowledge sharing behaviors. As advocated by scholars, an appropriate reward system will send positive signals to employees. When the rewards for knowledge sharing behaviors are given positive and positive information, employees will have inner confidence and a sense of competency, and then devote more efforts to the process of knowledge sharing.

Implications

Due to the economic impact caused by the COVID-19 epidemic, the perceived threat of identification by employees will lead to a reduction in knowledge sharing behaviors. The relevant management implications obtained through the research structure and research results are aimed at reducing the occurrence of workplace identity threats. First of all, the organization must let all employees understand the true meaning of the identity threat, as well as the process of its generation and the impact on employees. By understanding the connotation, action process and impact results of identity threats, employees can avoid behaviors that make others feel as identity threats in the process of interpersonal interaction, such as inadvertently making unreasonable comments about colleagues or making comments about gender and racial stereotypes of colleagues, etc., thus can be used to reduce the generation of identity threats in the organization. Furthermore, the results of this study also support that the work environment in the organization is the main source of identity threats. When the identity threat is higher, there will be a high demand for the accumulation and maintenance of social capital, so that employees can give value and meaning to individual identification through social relations and social interaction. Organizations can therefore reduce employee identity threats by advocating for a positive social environment. For example, organizations can promote diverse management, friendly workplaces, or supportive leadership to reduce the occurrence of identity threats.

The knowledge possessed by the employees is the accumulation of innovation capability, and the knowledge sharing behaviors among employees are the derivative results of social capital. This study suggests that managers can effectively manage interactions and communications among employees, it will develop inter-personal relationship, and then feedback and strengthen social capital. Therefore, when the managers strengthen employees' social capital, there will be more frequent interactions among employees, creating opportunities for employees to directly contact and exchange implicit and explicit knowledge, and the more it can promote the information circulation within the organization, enhance the effect of knowledge sharing within the organization, and form a better organizational atmosphere together.

Limitations

Although this study provides valuable insights into knowledge sharing among high-tech employees, several limitations remain. First of all, this study discusses identity threat from the perspective of environmental uncertainty. According to different theoretical perspectives, negative factors from working environment will have more diversified variables, including job insecurity, environmental uncertainty, et. Therefore, it is suggested that future researchers can propose various key variables that are more conducive to employees' knowledge sharing behavior based on different theories, so as to increase the richness of organizational behavior.

Social capital was regarded as an important antecedent variable in previous studies to discuss its effect on knowledge sharing behaviors. However, social capital can also be a moderator in the relationship between independent and dependent variables, and the social capital may be present in daily work, but not easy to be perceived by employees. Therefore, the moderating effect of social capital can be discussed in future studies to offer more analyses and insights.

Furthermore, due to the limitation of time and funds, this study could not study high-tech employees in different countries. Different countries may have large differences in employees' knowledge sharing behavior due to social and cultural differences. Therefore, this study suggests that future researchers can use regional factors as moderators to explore the influence of different regional factors on employees' knowledge sharing behavior.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Academic committee of Foshan university. The patients/participants provided their written informed consent to participate in this study.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Vlogger's persuasive strategy and consumers' purchase intention: The dual mediating role of para-social interactions and perceived value

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It is a new advertising marketing method for commodity companies to use vloggers to endorse their products, and to influence consumers' attitudes and decisions. In view of this phenomenon, there are few studies on the relationship between vloggers and consumers, and this study aims to explore how the persuasive strategies used by vloggers to promote products influence consumers' purchase intentions. Based on the concepts of Aristotle's persuasion theory, this study extracts two specific persuasive approaches, "two-sided messages" and "emotional appeal," to explore consumers' perceptions of them and the effectiveness of these two strategies. At the same time, para-social interaction and perceived value as intermediary factors are also included in the study for further discussion. The study empirically analyzed a sample of 511 questionnaires from participants who had purchased products recommended by vloggers and came to the following conclusions: (1) vloggers can enhance consumers' purchase intention by adopting two-sided messages persuasion when promoting products; (2) vloggers' emotional persuasion can enhance consumers' purchase intention; (3) as an intermediary variable, para-social interaction plays a more obvious role in vloggers' persuasion by appealing to emotions. The audience can have common feelings with vloggers, and they are more connected with each other, thus increasing their willingness to buy; (4) Perceived value, as an intermediary variable, plays a more obvious role in vloggers' persuasion with the two-sided messages. The two-sided messages can show vloggers' credibility and more abundant information about products, so that consumers have a positive perception of product value, and the direct persuasion effect of the two-sided messages is greater. Based on the results of the study, this paper helps vloggers to adopt different persuasive approaches for different types of audiences, choose the proper marketing methods, attract the potential customers, and achieve such purposes as enriching product marketing forms and increasing market share.

KEYWORDS

vlogger, Aristotle's three appeals of persuasion, para-social interactions, perceived value, purchase intention

Introduction

Persuasion is an effective way to change attitudes. When persuasion is the overriding goal, the way of presentation may be more important than the content of its proposition (Mcquarrie and Mick, 1996). Carl Hovland, an American psychologist and communicator, once put forward the theory of communication persuasion, and pointed out that the source, the content of information, the characteristics of the receiver and the background of information are the four major factors that affect persuasion (Demirdöge, 2010). Aristotle also once put forward the classical persuasion theory, arguing that persuaders can achieve the purpose of persuasion through three rhetorical methods: "ethos," "logos," and "pathos" (Fortenbaugh, 2016). In daily life, advertising is a persuasive tool in mass communication, which aims to impress the target audience or attract potential consumers, so as to create the desired changes in the target market and better sell products (Çam, 2019). A major theme of advertising and consumer research is how persuasive information can change people's thoughts, feelings and actions, especially in purchasing goods and services (McGuire, 2000). Traditional advertising methods are mainly newspapers, TV, posters and celebrity endorsements. Nowadays, with the development of the Internet, there are a large number of users on the online media platform who are famous for their self-performance and have established a huge social group of fans (Xu and Pratt, 2018; Ki and Kim, 2019; Lou and Yuan, 2019). These people are called online vloggers, social media influencers or online celebrities. Therefore, more and more enterprises or brand companies begin to use these online celebrities or vloggers to endorse their products, and enhance consumers' brand awareness and purchase decisions, which is also a new advertising marketing method (Lou and Yuan, 2019). These vloggers often have influence, perceived authenticity and multi-identity characteristics (De Veirman et al., 2017; Audrezet et al., 2020; Schouten et al., 2020). They usually share their created content online, show their lives or share product preferences, establish contact with followers and take online social activities as their career. Vloggers often attract followers around a specific field, such as beauty influencer, fashionista, fitness guru, etc. (Ki and Kim, 2019). They are usually in the intermediary position between commodity companies and consumers. They promote products through marketing forms such as brand placement, product evaluation and in-depth experience in videos, and push users who agree with their lifestyle to become consumers of products. Vloggers can often get product-related information from companies before the product is released (Onishi and Manchanda, 2012). Therefore, vloggers can experience products before consumers, and then convey their feelings to consumers, so that consumers can get product information and experience before purchasing, which will influence their judgment and choice of products. In particular, para-social interaction emphasizes a kind of unilateral intimacy between the audience and media figures, which creates an "illusion" of a face-to-face personal relationship between individuals and vloggers (Chen et al., 2021). Positive para-social interaction will make consumers more willing to accept the content published by vloggers on social media and increase their participation in the content published by vloggers (Labrecque, 2014), thus affecting the formation of their purchase intention.

Aiming at the relationship between vloggers and consumers, Esber and Wong (2020) pointed out that the marketing method of vloggers promoting products to followers on social media has become a new field that traditional marketing managers pay attention to. Consumers in the new era are growing up in the booming environment of Internet and social media. They are more eager for fun, challenges and socializing, and tend to exchange information on social media (Faulds and Mangold, 2009). Therefore, it is worth exploring how to use the Internet to achieve positive product marketing and how product companies and vloggers can better attract and persuade consumers. Existing scholars have focused on how vloggers influence consumers' perceptions and purchase intentions of luxury brands (Lee and Watkins, 2016), consumers' trust in vloggers and their change of online shopping intention (Bayazit et al., 2017), the impact of Instagram influencers' number of fans on product marketing (De Veirman et al., 2017), and consumers' perception of vloggers' credibility (Chapple and Cownie, 2017; Hill et al., 2020). However, a review reveals that there is not yet a wealth of academic research on the relationship between vloggers and consumers, and little attention has been paid to the impact of vloggers' persuasion strategies on consumers. Therefore, this paper will draw on the classic Aristotle's persuasion theory to explore how vloggers' persuasive strategies affect consumers' purchase intention. At the same time, para-social interaction and perceived value often play an essential role in consumers' purchasing decisions (Dodds and Monroe, 1985; Labrecque, 2014), therefore, these two are included in this paper as mediating factors for further examination. This study attempts to explore the following questions: first, how can traditional Aristotle's three persuasion theories be applied to the persuasion strategies or methods of modern vloggers? Second, how do vloggers' persuasion strategies affect consumers' purchase intention? Thirdly, how do para-social interaction and perceived value play an intermediary role in the process of vloggers influencing consumers' purchase intention, and compare their intermediary role in different persuasion strategies. Figure 1 demonstrates the conceptual model of this study.

According to the above problems, this study begins with a theoretical analysis and literature review. Based on the concept of Aristotle's persuasion theory and the factors that affect vloggers' marketing, and extracts two specific persuasion strategies, namely "two-sided messages" and "emotional appeal," to explore consumers' perception of them and the effectiveness of these strategies. Second, the study collected topic-related data through a questionnaire.

Finally, quantitative analysis and modeling were used to test the hypothesis that the vlogger persuasion strategy affects consumers' purchase intentions, and conclusions were drawn. The possible contributions of this study include: Firstly, from the perspective of persuasion communication, it is beneficial to enrich the related research in the field of Internet marketing, reveal the internal relationship between language and consumer behavior, and hopefully provide helpful guidance for vloggers' marketing practice. Secondly, the intermediary of para-social interaction and perceived value helps to explain the transmission path that affects consumers' purchase intention and uncover the process of language effect. Finally, this study can help commodity companies and vloggers fully understand consumers' psychology, pay attention to the influence of different language styles on consumers' psychology, give weight to the use of appropriate language rhetoric in advertisements, attract potential customers, and guide consumers to enhance their purchase intention.

Literature review and research hypothesis

Literature review

Contemporary application of Aristotle's persuasion theory

Persuasion refers to the using specific strategies by individuals or groups to influence the perceptions and actions of others through the transmission of message, so that others accept their views and thus achieve the desired purpose (Amos et al., 2022). The act of persuasion has a wide scope, involving politics, culture, business, and daily interactions between people. Aristotle's theory of persuasion identifies three approaches, "ethos," "logos," and "pathos." The process of persuading others is essentially the application of these three modes of persuasion (Amos et al., 2022).

First of all, "ethos" refers to the persuader's credibility. When the persuader is trustworthy and can win the audience's trust, the audience will accept their point of view and think that their ideas are authentic (Alkhirbash, 2016). Secondly, "logos" mainly refers to any rational appeal based on a logical conclusion. Persuaders try to convince the audience with a reasonable claim and provide appropriate evidence to support their statements (Murthy and Ghosal, 2014). Finally, "pathos" refers to the speaker's persuasion effect by mobilizing the audience's emotion, appealing to the audience's values and emotions and arousing the public's deep resonance.

Aristotle's theory of persuasion has been widely used in various research fields. Specifically, in the field of politics, Aristotle's three persuasion methods are often used to analyze the speeches of presidents and celebrities (Ghazani, 2016; Montgomery, 2017; Raissouni, 2020), as well as the effects of persuasion in political systems and texts (Brown et al., 2012). Persuasion is considered to be linguistically manipulative in that it is a strategy of unobtrusive discourse to subconsciously influence the listener's beliefs and attitudes. In addition, with the development of the Internet, Aristotle's persuasion theory has been applied to explore issues such as the effectiveness of persuasion in website design and e-commerce platforms (Chu et al., 2014; Tirdatov, 2014). In the field of advertising and consumers, McGuire (2000) analyzed figurative language, such as metaphors, similes, rhetorical questions, hyperboles, etc., and found that the message style variables of language have a certain influence on the perception and persuasion effect of communication. Lamichhane (2017) concluded by comparing Aristotle's three persuasion methods that the emotional appeal in advertising content and text information can influence advertising effect and consumer behavior more than the other two. Çam (2019) constructed Aristotle's persuasion framework, which summarized "ethos" as "expert, attractive, trustworthy, etc.," "logos" as "narrative, testimony, comparison, etc.," and "pathos" as "fear, excitement, reliance, etc.," and analyzes the content of advertising rhetorical structure through the refinement of meaning. These are the innovative applications of traditional Aristotle's theory in contemporary research in various fields.

Thus, past research has confirmed the excellent applicability of Aristotle's persuasion theory. In the context of online influencer marketing, the expression or persuasion of vloggers in promoting products is an important means to connect and attract consumers and arouse their desire to buy. In the past, scholars generally studied Aristotle's persuasion theory in traditional television commercials or advertising texts, or focused on the rhetorical analysis of advertising language. This study turns its perspective to the discourse expressions of vloggers in social media, trying to provide new ideas and directions for the contemporary application of this theory.

Vlogger marketing and consumers

Vlogger's marketing relies on the rapid development of online media and the spread of information, which has become an efficient new marketing method and a new paradigm for information dissemination (Lou and Yuan, 2019; Stubb et al., 2019). In response to this phenomenon, existing scholars have studied the topic from three main perspectives:

The first is the study of credibility. Existing studies consider trust as one of the important factors affecting the effectiveness of vlogger marketing and analyze the construction of trust in vlogger marketing based on source credibility theory (De Veirman et al., 2017; Djafarova and Rushworth, 2017). Sparks and Browning (2011) stated that trust and consumer purchase decisions are positively related, with trust increasing consumers' perceived value of the merchant and serving to reduce perceived risk and promote purchase. The higher the level of trust the more likely consumers are to make a purchase. Perceived credibility plays a vital role in consumers' decision-making process and can reduce uncertainty. Recipients are more likely to be convinced by sources that they think are credible or attractive (McCroskey et al., 1974). Vloggers' generated content usually adds their personal characteristics and the information they post is usually not perceived as purely driven by commercial interests (Bao and Chang, 2014), which not only provides an enjoyable experience for followers, but also enhances the audience's trust in the product and their willingness to buy it (Breves et al., 2019). Research in this area has fully revealed the importance of trust in vlogger marketing.

The second is identity research. Identity is another important influencing factor of vlogger marketing put forward by researchers. When consumers find similarities between their image and that of the vlogger, such as shared interests, values and characteristics, it evokes similar feelings of identification, making them more likely to adopt the vlogger's beliefs, attitudes and behaviors (Schouten et al., 2020). This identification in turn has an impact on the subsequent behavior of the consumer. Accordingly, the generation of identity is more related to consumers' emotional activity and emotional perception.

The third is the study of para-social interaction. Para-social interaction originated from psychology, focusing on the relationship between Internet celebrities and consumers. Para-social interactions create an imaginary or real interaction between the consumer and the vlogger. Consumers can interact with vloggers and communicate their thoughts and feelings. Consumers give feedback on the content published by vloggers, including likes, comments, reposts, etc. (Dibble et al., 2016). Scholars have confirmed that the para-social interaction between vloggers and consumers will affect consumers' purchase intention (Jin and Ryu, 2020; Sokolova and Kefi, 2020), the para-social relationship between them will affect the establishment of perceived credibility (Reinikainen et al., 2020).

Based on the above, it can be seen that in past studies of the vlogger-consumer relationship, the audience's perception of vlogger's credibility, identification or cognitive emotions, and intimate interactions and relationships on the Internet all affect their acceptance of vlogger marketing. This study will also make new explorations and attempts from these perspectives, combining perceived values and correlating them for analysis.

Research hypothesis

Persuasion strategies of "ethos" and "logos" and consumers' purchase intention

"Ethos" refers to the credibility and authority of the speaker, that is, the persuader makes the audience think that they have the right to speak on a certain issue by demonstrating their ability and experience (Powell et al., 2011). Vloggers usually have certain professional knowledge in specific fields, such as health care, tourism, food, fitness, make-up, fashion, etc. Djafarova and Rushworth (2017) pointed out that the professional skills and knowledge displayed by vloggers in specific fields will form the audience's trust in their recommended products. In addition, "logos" pays attention to the credibility of the persuasive content. The speakers usually demonstrate their views with the help of information, comparison, factual evidence and other elements, and weigh the pros and cons to the audience (Lamichhane, 2017). Thus, both "ethos" and "logos" emphasize credibility to a certain extent.

In advertising research, credibility is divided into "source credibility" and "content credibility." This distinction was first put forward by communication scholar Rosenthal (1971), and then confirmed by Botan and Frey (1983). According to the message persuasion model, the credibility of the communicator or source is an important factor in its persuasive power, and people often judge the credibility of a message from the source and the content of the message (Hovland and Weiss, 1951). Factors such as the audience's cognitive ability and willingness will interact with the source and message content, and jointly affect the persuasion effect (Petty et al., 1983). A persuasive information source has many language strategies that can be used to explain information. The information source must make a choice whether to present one-sided messages (presenting only the product's benefits) or two-sided messages (presenting both the product's benefits and drawbacks) (Hale et al., 1991).

On the one hand, persuaders presenting two-sided messages can effectively enhance their credibility as information sources. For example, Hendriks et al. (2022) confirmed that when scientists provide two-sided messages in health communication, people's trust in the scientist will increase. Mayweg-Paus and Jucks (2018) also pointed out that experts can gather more consensus and gain more trust by taking a two-sided messages position to communicate. Winter and Krämer (2012) used ELM model to study that among the numerous and complicated information on the Internet, people would prefer those users who have professional knowledge and provide two-sided messages. Two-sided messages strategy contains tips on product defects or negative information. Consumers can easily think that advertisers are honest and their advertising claims are credible (Kamins and Assael, 1987).

On the other hand, two-sided messages provide more comprehensive factual evidence, which can enhance the credibility of the information content. Specifically, in the research on consumer behavior, many scholars think that two-sided messages is often more convincing (Golden and Alpert, 1987; Kamins et al., 1989; Sherman et al., 1991; Clemons et al., 2006). Ahluwalia et al. (2000) found that consumers usually think negative information is more valuable, and they will refer more to the influence of negative information in purchasing decisions. One-sided messages guarantee the quality of products because it is "too good to be true" and thus loses its effectiveness (Shimp and Bearden, 1982). When consumers convey richer, more positive and accurate data or information, they can make more informed choices and decisions (Hibbard and Peters, 2003; Berning et al., 2011; Wei and Miao, 2013).

Based on the above, two-sided messages, a type of information presentation, can cause audiences to perceive trust in both the communicator himself and the content of the communication and influence their consumption decisions. Therefore, this paper adopts the variable of two-sided messages as a persuasive factor and puts forward the following hypothesis:

H1a: Consumers' perception of the credibility of vloggers' two-sided messages persuasion positively relates to their purchase intention.

Persuasion strategy of "pathos" and consumers' purchase intention

"Pathos" is the persuasive power to stimulate or control the audience's psychological reaction. Emotion is an instinctive psychological state, which is usually triggered by some stimulating events, that is, the stimulation occurring in the organism will trigger psychological reactions such as liking, pleasure, impulsiveness and anxiety (Scherer, 2005). Emotional changes will lead to different judgments, and audiences will make different judgments under different emotions (Yi and Jai, 2020). Aristotle believed that speakers must be good at analyzing the psychology and emotions of different types of audiences in order to target their emotions and put the audience in a certain state of mind that the speakers expect, so that persuasion can be successful (Ghazani, 2016). Emotions are believed to play an important role in decision-making. Many of the choices people make are guided by emotions, while decisions and consequences can also produce various emotions (Brosch et al., 2013). In the study of consumer behavior, emotional factors are often valued by scholars. According to Gardner (1985), advertising content often affects consumers' emotional state by using emotional music, pictures or words. Consumers with more positive emotions are more likely to have impulsive buying behavior (Rook and Gardner, 1993). Among Aristotle's three persuasion strategies, "pathos" means that the persuader influences people's rational judgment by arousing the audience's emotion (Al-Momani, 2014), specifically appealing to fear, evoking sympathy, anger or joy, which are considered important persuasive tools to compensate for the lack of sensory experience of consumers and to create positive feelings about the product. De Pelsmacker and Geuens (1997) divided the emotional stimulation in advertisements into six categories: humor, warmth, nostalgia, eroticism, provocation and fear. He believed that advertisers used more elaborate "emotion-oriented" strategies to influence the audience's attitude toward products. Consumers' emotional state fluctuates before, during and after consumption, and emotions generally affect people's emotional decisions (Yi and Jai, 2020). Therefore, according to previous studies, vloggers' emotional persuasion can infect consumers, prompting them to have certain emotional reactions, and thus play a role in consumers' purchase intention and behavior. Based on this, this study makes the following hypothesis:

H1b: The appeal of vloggers' emotional persuasion is positively related to consumers' purchase intention.

The mediating effect of para-social interaction

Horton and Richard Wohl (1956) put forward the concept of para-social interaction (PSI). They think the new mass media gives people the illusion of face-to-face communication. The seemingly face-to-face relationship between the audience and performers is called para-social relationship, and para-social interaction is the degree to which media users regard media celebrities as close social partners. After the concept was put forward, scholars studied the para-social interaction between users and media figures in various backgrounds. For example, Levy (1979) studied the para-social relationship between TV news viewers and news figures, and pointed out that para-social interaction provided emotional satisfaction for viewers and encouraged them to continue watching programs. Hoffner (1996) explored the relationship between children and their favorite TV characters. Wenner (1976) confirmed that TV can accompany and compensate the face-to-face social interaction between the elderly and others, and help to reduce their loneliness. Auter and Palmgreen (2000) developed a new multi-dimensional social interaction scale based on previous research to test the relationship between viewers and TV roles. In recent years, PSI theory has been used to explore consumer behavior in the online environment, and mainly focuses on the relationship between digital celebrities and fans (Hills, 2015; Hsu, 2020), the influence of para-social interaction on brand evaluation (Zhang and Hung, 2020; Zhang et al., 2022), and how the para-social relationship between users and vloggers affects users' purchase intention (Kim et al., 2015).

As the main platform for consumers to communicate with online vloggers, social media breaks the time and space constraints, increases the frequency of interaction between consumers and vloggers, and provides the foundation for cultivating the para-social relationship between them. The relationship between consumers and vloggers further affects consumers' willingness to accept advertisements published by vloggers and their attitudes and behaviors toward products endorsed by vloggers. As consumers can communicate and interact directly with characters on social media and make comments like friends, this para-social interaction atmosphere helps to cultivate close social relationships between media celebrities and audiences (Labrecque, 2014; Chung and Cho, 2017), which in turn can reduce consumers' concerns and encourage them to purchase. That is to say, the media platform shortens the distance between ordinary users and vloggers, and provides a possibility for ordinary users to communicate with Internet celebrities and form social relationships. The closer this relationship is, the more likely consumers are to buy products recommended by vloggers. The existing research also proves that para-social interaction has become the mechanism of social media's influence on its users (Colliander and Dahlén, 2011; Yuan et al., 2016; Gong and Li, 2017). Therefore, para-social interaction is a particularly appropriate and useful perspective to explain the influence of vloggers on the audience from the perspective of consumers' emotions. According to the above analysis, the following hypotheses are put forward:

H2a: Para-social interactions has a mediating effect between consumers' perception of the credibility of vloggers' two-sided messages persuasion and their purchase intention.
H2b: Para-social interactions has a mediating effect between the appeal of vloggers' emotional persuasion and consumers' purchase intention.
H2c: The mediating effect of para-social interaction between vloggers' emotional persuasion and consumers' purchase intention is greater than that between the credibility of two-sided messages persuasion and purchase intention.

The mediating effect of perceived value

Dodds and Monroe (1985) studied the relationship among three structures: perceived quality, perceived value and purchase intention, and pointed out that perceived value affects consumers' purchase behavior, and they are more willing to buy products with high perceived value. When consumers buy products, they will subjectively perceive and judge the value of products (Zeithaml, 1988). In Internet marketing, consumers can get useful product information through the introduction of vloggers, such as the practicality, reliability and usability of products, and then form the value perception of target products through value judgment. In the process of value judgment, when consumers perceive that the quality, function and service of products have reached the expected goal, they will have higher perceived value. According to Chi and Yeh (2011), consumers can transfer their attitudes and feelings toward advertising spokespersons to products and create perceived value. Casal et al. (2008) pointed out that when consumers perceive the value of product availability, it is easy for them to positively evaluate the product, thus stimulating their potential demand. If the product can meet consumers' target demand, it will stimulate their purchase intention. In addition to consumers who have a demand for products, when consumers who have no demand for products perceive that products can bring them higher profits, they will also enhance their perception of the value of products, thus triggering a strong purchase intention (Zeithaml, 1988). To sum up, vloggers can promote consumers' understanding of product performance and improve their perception of value by selling and introducing products to the audience, and higher perceived value will contribute to higher purchase intention. Accordingly, this study puts forward the following hypotheses:

H3a: Perceived value has a mediating effect between consumers' credibility perception of vloggers' two-sided messages persuasion and purchase intention.
H3b: Perceived value has a mediating effect between the appeal of vloggers' emotional persuasion and consumers' purchase intention.
H3c: The mediating effect of perceived value between the credibility of two-sided messages persuasion and purchase intention is greater than that between vloggers' emotional persuasion and consumers' purchase intention.

Research design

Participants and procedure

Participants were recruited online with the help of the first author's colleagues and friends' assistance in forwarding the recruitment information of our study. Specifically, we made an online advertising poster that indicated the brief purpose and requirements of the study. Participants were required to have experience watching vloggers introducing products. Participants who read the recruitment information can scan the QR code, which would guide them to a page that specifically explains detailed content, and participation rules of the study. Participants were voluntary, and assured of full confidentiality. After giving the consent, participants could click the "next page" button and fill in the formal questionnaires. If they were unwilling to participate, they could close the page anytime. Each participant was rewarded 1.2 USD upon finishing the survey. The study was conducted in accordance with the principles of the Declaration of Helsinki and approved by the ethics committee of the first author's university.

Participants were asked to answer two screening questions about whether vloggers they watched had used two-sided messages persuasion (i.e., vloggers indicating both advantages and disadvantages of the products) or emotional persuasion (i.e., vloggers resorting to emotional arousals to promote the products). Only those who chose "yes" in both questions could continue filling in the following questionnaires that consisted appeal of emotional persuasion, credibility of two-sided messages persuasion, para-social interactions, perceived value of the products, purchase intention, and their demographic information. In an effort to minimize common-method bias, we used two different versions of the survey instruments by randomly determining the order of the measures (Ambrose and Schminke, 2009). Additionally, we added an attention check item (i.e., "please choose 2 for this item") in the survey to guarantee the quality.

We received 532 returned responses. The initial screening revealed 7 repetitiveness and 5 incompleteness. We then removed 9 participants who answered the attention check items wrong, yielding 511 effective responses. One hundred and ninety participants (37.2%) were male, and 321 of them were female (68.2%). About 65.9% of the participants were between 21 and 30 years old, and 21.3% of them were between 31 and 40 years old. Regarding the platforms, about 62.2% of the participants indicated that they usually use Tiktok to watch vloggers' videos, 54.2% use Kuaishou, 64.2% use Weibo, and 63.1% use Xiaohongshu. Approximately 73% of them would watch food-related content, 58.3% of them cared about fashion, and 45.2% would watch electronic devices. About 7% of the participants never bought the products promoted by vloggers, 56.4% had 1 to 5 purchase experiences after they were persuaded by the vloggers they watched, 29.4% of them had 6 to 10 purchase experiences after vloggers' promotions, and 7.2% had more than 11 purchase experiences after being persuaded by vloggers. Additionally, 20.5% of them spent <100 Yuan for the most expensive single item advertised by vlogger, 48.1% of them paid 100–500 Yuan for the most expensive item, 24.9% of them spent 500–1000 Yuan for a single item, and 6.5% spent more than 1000 Yuan for the most expensive item they bought that was promoted by vloggers.

Measure

A standard translation and back-translation procedure were followed (Brislin, 1976) to ensure that all the survey items were accurately translated from English to Chinese. All items measured in the survey were anchored to a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). It is worth mentioning that in order to ensure that participants can correctly understand the meaning of two-sided messages and emotional appeals, and make reasonable and realistic choices, we have made additional explanations next to the questionnaire items of two-sided messages and emotional appeals. For example: "When a vlogger promotes a product and informs the two-sided messages of the product (two-sided messages mean that both the advantages and disadvantages of the product are explained in the introduction), I would consider the vlogger a trustworthy person"; and "When a vlogger promotes a product and uses more emotionally stimulating (e.g., nostalgia: nostalgia for good things in the past; e.g., warmth: positive, emotional awakening about love, family and friendship; e.g., fear appeal: evoking people's sense of crisis and tension, like "after 30 years old, your body is not good, you need to supplement xx," etc.), it will be more attractive to me. Thus, participants were selected on the basis of a complete understanding of all measurement items.

The credibility of two-sided messages persuasion was measured with adapted 4-item scale of Wang et al.'s (2017) Trustworthiness scale. An example was "The vloggers' two-sided messages persuasion made me feel that the advertisements had a trustworthy (dependable, honest, sincere, reliable) endorser." Cronbach's alpha of the scale was.75 in the current study.

The appeal of emotional persuasion was measured with the adapted nine items based on the instrument introduced by Walters et al. (2012). An example item was "The vloggers' emotional persuasion made me fantasize about having the opportunity to use the product" Cronbach's alpha at was 0.94 in the current study.

Para-social interaction was measured with the 6-item Para-social interaction scale developed by Kim (2013). An example item was "I feel close enough to the vloggers to use his(her) social media platform." Cronbach's alpha at was 0.77.

Perceived product value was measured with Sweeney and Soutar's (2001) 6-item Quality value scale. An example item was "This product has an acceptable standard of quality." Cronbach's alpha was 0.84 in the current study.

Consumers' purchase intention was measured using Choi and Lee's (2019) 4-item Purchase Intention scale. An example item was "I would like to use the products that have been promoted by the vlogger on the video." Cronbach's alpha at was 0.79.

Control variables. We controlled participants' age and gender in testing the hypotheses. Because prior research has shown that gender and age may be persuaded in different ways and thus develop different levels of purchase intention (Vilela and Nelson, 2016; Adaji et al., 2019).

Results

Analytical strategy

First, we conducted confirmatory factor analyses with Mplus 7.4 (Muthen et al., 2017) to examine whether the measurement scales represented distinct constructs. We then employed Path analyses in Mplus to test our hypotheses. Similar but more powerful than regression analyses, path analyses can simultaneously examine the parallel mediating effects (Muthen et al., 2017). Specifically, we first conducted Model 1 to test Hypothesis 1, and then in Model 2 we used bootstrapping to test and compare the parallel mediating effects of perceived product value and para-social interaction in the relationships of two types of persuasions and consumers' purchase intention. Finally, we conducted the supplementary analysis to test the common method bias issue, and tested an alternative model that excluded control variables to ensure the robustness of our model.

Confirmatory factor analyses

As shown in Table 1, the hypothesized five-factor model exhibited a good fit to the data [$\chi^2(333) = 898.76$, $p < 0.001$,

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TABLE 1 Results of the confirmatory factor analyses ($N = 511$).

Model	$\chi^2\,(df)$	RMSEA	CFI	TLI	SRMR	Change from hypothesized model $\Delta\chi^2\,(df)$
1. Hypothesized 5-factor model	898.76 (333)	0.06	0.92	0.91	0.06	
2. Four-factor model (two independent combined together)	1237.90 (337)	0.07	0.87	0.85	0.08	339.14 (4)
3. Three-factor model (two independent variables combined together, and two mediators combined together)	1406.33 (340)	0.08	0.84	0.83	0.08	507.57 (7)
4. One-factor model (all five factors were combined into one factor)	1441.12 (342)	0.08	0.82	0.80	0.10	542.36 (9)

df, degrees of freedom; NNFI, Non-Normed Fit Index; CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation.

TABLE 2 Means, standard deviations, and correlations of the focal variables in study ($N = 511$).

Variables	*M*	*SD*	1	2	3	4	5	6	7
1. Age	2.29	0.51	-						
2. Gender	1.63	0.48	−0.13**	-					
Credibility of two-sided messages persuasion	3.84	0.65	0.13*	−0.02	(0.75)				
Appeal of emotional persuasion	3.44	0.95	0.24**	−0.13**	0.33**	(0.94)			
Perceived product value	3.81	0.73	0.13**	−0.06	0.52**	0.52**	(0.77)		
Para-social interaction	3.66	0.66	0.24**	−0.14**	0.48**	0.57**	0.59**	(0.84)	
Consumers' purchase intention	3.88	0.61	0.21**	−0.09	0.46**	0.48**	0.43**	0.65**	(0.79)

Age: 1 = over 20 years' old, 2 = 21–30 years' old; 3 = 31–40 years' old; 4 = over 40 years' old. Gender: 1 = male, 2 = female. Alpha internal consistency reliability coefficients appear on the main diagonal. Significance was determined using a two-tailed test. $^{*}p < 0.05$, $^{**}p < 0.01$.

SRMR = 0.06, CFI = 0.92, TLI = 0.91, RMSEA = 0.06]. Furthermore, the five-factor model fitted better than other alternative models. Therefore, measures of the studied variables had good validity.

Descriptive statistics and correlations

Table 2 shows the means, standard deviations, and correlations among the studied variables. As expected, the credibility of two-sided messages persuasion is positively related to the consumer's purchase intention ($r = 0.46$, $p < 0.001$), and the appeal of emotional persuasion is positively related to the consumer's purchase intention too ($r = 0.48$, $p < 0.001$). Besides, both the credibility of two-sided messages persuasion and the appeal of emotional persuasion are positively correlated with perceived product value ($r = 0.52$, $p < 0.001$). Furthermore, the credibility of two-sided messages persuasion is positively correlated with para-social interactions ($r = 0.48$, $p < 0.001$), and the appeal of emotional persuasion and para-social interaction is positively correlated too ($r = 0.57$, $p < 0.001$). These correlations provide initial support for our hypotheses.

Hypotheses testing

Hypothesis 1 proposed positive relationships of credibility of two-sided messages persuasion (1a) and appeal of emotional persuasion (1b) with consumers' purchase intention. As shown in Model 1 of Table 3, the results showed that the credibility of two-sided messages persuasion was positively related to consumers' purchase intention ($\beta = 0.33$, $p < 0.001$), and the appeal of vloggers' emotional persuasion was positively related to consumers' purchase intention too ($\beta = 0.34$, $p < 0.001$). Therefore, Hypothesis 1a and 1b were supported. The direct effects model accounted for 33.0% variance of participants' purchase intention.

Then we conducted Model 2 to test the mediating effects of para-social interaction and perceived product value and in the relationships of two kinds of persuasions and consumers' purchase intention. As shown in Table 3, the results showed that para-social interaction mediated the positive relationship between perceived credibility of two-sided messages persuasion with consumers' purchase intention (indirect effect = 0.10, 95% CI = [0.05, 0.15]), supporting Hypothesis 2a. Para-social interaction mediated the positive relationship between vloggers' appeal of emotional persuasion with consumers' purchase

TABLE 3 Path analysis results of the direct and indirect effects ($N = 511$).

Dependent variables	**Model 1**		**Model 2**					
	Consumers' purchase intention		**Perceived product value**		**Para-social interaction**		**Consumers' purchase intention**	
Measures	***B (SE)***	***p***	***B (SE)***	***p***	***B (SE)***	***p***	***B (SE)***	***p***
Gender	−0.03	0.04	−0.01	0.03	−0.06	0.04	0.01	0.04
Age	0.08	0.04	−0.03	0.04	0.06	0.04	0.07*	0.03
Credibility of two-sided messages persuasion	0.33**	0.05	0.52**	0.05	0.23**	0.04		
Appeal of emotional persuasion	0.34**	0.06	0.33**	0.05	0.55**	0.05		
Perceived product value							0.26**	0.06
Para-social interaction							0.45**	0.05
R^2	0.33**	0.04	0.48**	0.04	0.48**	0.05	0.40**	0.05

Mediating effects	**Indirect effect**	***LLCI***	***UCLI***
Credibility of two-sided messages persuasion→ perceived product value→ consumers' purchase intention	0.14** (0.03)	0.07	0.20
Credibility of two-sided messages persuasion→ para-social interaction→ consumers' purchase intention	0.10** (0.03)	0.05	0.15
Appeal of emotional persuasion→ perceived product value→ consumers' purchase intention	0.09**(0.02)	0.04	0.13
Appeal of emotional persuasion→ para-social interaction→ consumers' purchase intention	0.25** (0.03)	0.18	0.32

Age: 1 = over 20 years' old, 2 = 21–30 years' old; 3 = 31–40 years' old; 4 = over 40 years' old. Gender: 1 = male, 2 = female. Significance was determined using a two-tailed test. Bootstrap sample size = 10,000. LLCI, lower level of the 95% confidence interval. UCLI, upper level of the 95% confidence interval. *p < 0.05, **p < 0.01.

intention (indirect effect = 0.25, 95% CI = [0.18, 0.32]), thus Hypothesis 2b was supported. Additionally, the mediating effect of para-social interactions in the relationship between perceived credibility of emotional persuasion with purchase intention is more significant (difference of indirect effect = 0.07, 95% CI = [0.02, 0.12]) than that between perceived credibility of two-sided messages persuasion with purchase intention, supporting Hypothesis 2c.

Simultaneously, results of Model 2 showed that perceived product value mediated the positive relationship between perceived credibility of vloggers' two-sided messages persuasion with consumers' purchase intention (indirect effect = 0.14, 95% CI = [0.07, 0.20]), supporting Hypothesis 3a. Besides, we found that perceived product value mediated the positive relationship between vloggers' appeal of emotional persuasion with consumers' purchase intention (indirect effect = 0.09, 95% CI = [0.04, 0.13]). Therefore, Hypothesis 3b was supported. Furthermore, comparing the mediating effects of perceived product value in the relationship between two different persuasions and consumers' purchase intention, we found that such mediating effect is stronger in the association of perceived credibility of two-sided messages persuasion with consumers' purchase intention than the appeal of emotional persuasion (difference of indirect effect = 0.06, 95% CI = [0.01, 0.12]). The parallel mediating model accounted for the variance of consumers' purchase intention. Therefore, Hypothesis 3c is supported. Figure 2 demonstrates the standardized coefficients of the integral model.

Supplementary analyses

We addressed common method issue by creating a new construct of named common latent factor (e.g., Eichhorn, 2014). The result showed that the differences in standardized regression weights of constraint and unconstrained models were smaller than 0.20 for all the latent variables. Therefore, we assume that the current results were not substantially contaminated by the common method bias (e.g., Afthanorhan et al., 2021). Additionally, we re-ran the model without control variables of participants' age and gender, and the results remained unchanged. Specifically, we found the mediation of para-social interactions is more positive in the relationship between the appeal of emotional persuasion (vs. credibility of two-sided messages persuasion) with consumers' purchase intention (difference of indirect effect = 0.07, 95% CI = [0.02, 0.12]), and the mediation of credibility of two-sided messages is more positive in the relationship between two-sided messages persuasion (vs. appeal of emotional persuasion) with consumers' purchase intention (difference of indirect effect = 0.07, 95% CI = [0.02, 0.13]).

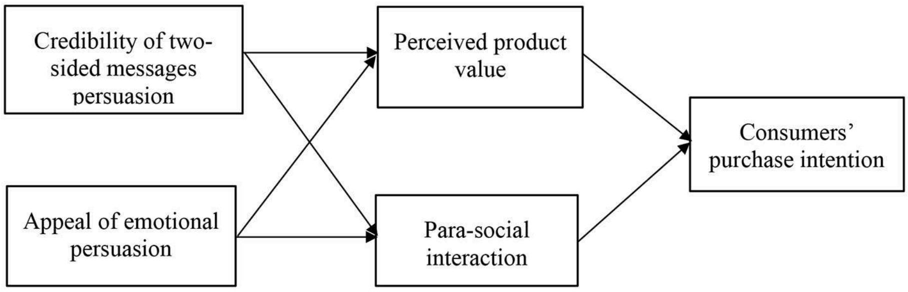

FIGURE 1
Theoretical model.

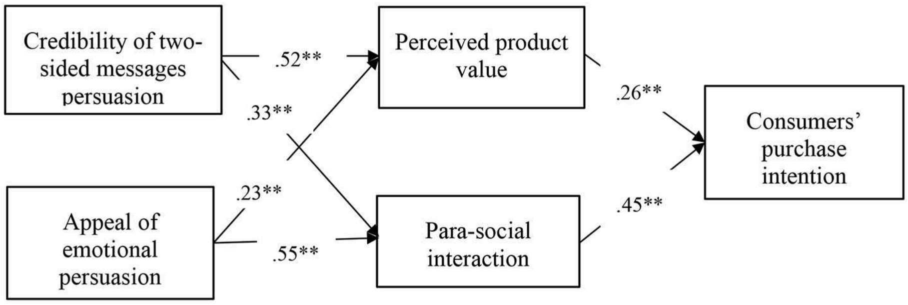

FIGURE 2
Standardized coefficients for the hypothesized model. ** = $p < 0.001$.

Research discussion

Conclusion

Starting from Aristotle's three appeals of persuasion, this study explores how vloggers' persuasion skills affect consumers' purchase intention, and draws the following conclusions:

First of all, vloggers' two-sided messages persuasion skills in promoting products have a significant positive impact on consumers' purchase intention. The results show that when vloggers use two-sided messages persuasion, it will increase the audience's trust in vloggers and their positive perception of products. This finding is consistent with previous studies. For example, Bohner et al. (2003) found in the study of advertising that two-sided advertising is more effective than one-sided advertising, because two-sided messages have two main functions when applied to advertising. First, it can increase consumers' perception of the credibility of information sources; second, it is the logical relationship between the relative importance of negative and positive information, which can promote consumers' favorable inference of essential attributes of products. This conclusion also confirms that two-sided messages can help explain Aristotle's persuasion theory of "ethos" and "logos."

Secondly, the appeal of emotional persuasion of vloggers in promoting products significantly impacts consumers' purchase intention. The results of this study are consistent with previous research conclusions, which confirm the significant relationship between emotional persuasion and consumers' purchase intention. Some emotional appeals will affect consumers by changing the way the information conveyed in the appeal is processed (Achar et al., 2016). In this study, vloggers can stimulate and infect consumers by resorting to emotional expressions, and mobilize their different emotional perceptions of products, thus affecting their purchasing decisions.

Thirdly, para-social interaction mediates the relationship between vloggers' persuasive strategies and consumers' purchase intention, which is consistent with previous scholars' research (Jin and Ryu, 2020; Sokolova and Kefi, 2020). However, different from previous studies, this study draws a conclusion by comparing two-sided messages persuasion with emotional persuasion. When para-social interaction is used as an intermediary variable, compared with two-sided messages persuasion, vloggers' appeal to emotional appeal will make the audience feel stronger interaction with vloggers, produce common feelings and have stronger connection with each other, thus increasing the persuasion effect. That is to say, among Aristotle's three persuasion methods, the intermediary role of para-social interaction in "pathos" is greater than that of "ethos" and "logos." Therefore, when vloggers cultivate a close and lasting connection, companionship, recognition, trust and attachment with the audience, it may be better to use emotional persuasion skills to promote products.

Finally, the mediating effect of perceived value in the relationship between vloggers' persuasive strategies and consumers' purchase intention has reached a significant level, indicating that vloggers' persuasive skills in promoting products will lead to consumers' perceived value, and then affect their purchase intention. This conclusion is consistent with the research of related scholars (Kwon et al., 2007; Gan and Wang, 2017). However, this study found that compared with emotional persuasion, perceived value plays a more obvious mediating role between vloggers' two-sided messages persuasion and consumers' purchase intention. In other words, when vloggers show credibility, professional knowledge and more abundant information of products by presenting the two-sided messages, they can make consumers feel that the value of products is higher. Therefore, the direct persuasion effect of two-sided messages is more excellent.

Theoretical implications

First of all, this study combines classical Aristotle's theory with the contemporary social context, which can provide new ideas for understanding the social popular culture and phenomena. At the same time, this study also summarizes the connotation of Aristotle's persuasion theory and extracts variables convenient for measurement to construct an analytical model. This method expands the application scope of the original theory, and provides a reference for related research in the future.

Secondly, this study takes para-social interaction and perceived value as dual mediators, para-social interaction emphasizes emotional value, and perceived value tends to rational judgment. Therefore, this paper is to incorporate both emotional and rational traits of consumers into the study, which to a certain extent can help advertising parties better understand audience psychology.

Practical implications

First of all, vloggers can better understand the audience's psychology, choose the proper marketing methods, establish a good and harmonious relationship with the audience, and enhance their influence. In the Internet era, various media have facilitated the life of the general public, and people have become more dependent on online information and tend to communicate through the media. At the same time, mass communication channels such as TV are replaced by online media channels in the media environment. Using the influence of key individuals or opinion leaders on media platforms to enhance consumers' brand awareness or purchase decisions has become a new marketing tool. Nowadays, the economic value of the Internet has attracted more and more people to become Internet celebrities, and all kinds of network information are jumbled, affecting the audience to make correct judgments. Therefore, it is particularly important for vloggers to adopt persuasion techniques to win the attention and trust of the audience and win the favor of brand owners. Based on para-social interaction and perceived value, this study explores how different persuasion strategies affect consumers' psychology, which helps vloggers adopt different persuasion methods for different types of audiences, and pay attention to the influence of different language styles on consumers' psychology. At the same time, attention is paid to using appropriate language rhetoric in advertisements, attracting potential customers, and guiding consumers to enhance their purchase intention.

Secondly, the characteristics of online vloggers determine that they can not only contact and influence a large number of consumers, but also reflect their marketing value through the creation and dissemination of content. Online vlogger marketing is a crucial paradigm for changing the traditional relationship between enterprises and consumers. This brand-new relationship not only changes the presentation mode of marketing information of commodity companies, but also derives a new mode of commodity value dissemination, which creates significant value for companies. Vloggers' different discourse persuasion skills enrich the forms of product display and marketing. For commodity companies or brand owners, this can not only improve sales performance, but also positively impact on consumers' brand attitude and purchase intention, which is conducive to enhancing product market share and brand image, and even consumers can further endorse brands based on personal social networks.

Finally, for consumers, they can quickly and accurately obtain product information based on vloggers' different language strategies, reduce the purchase risk, and at the same time satisfy their willingness to communicate with vloggers and meet their spiritual needs.

Limitations

There are some limitations in this study, which need to be further discussed. First of all, there are many factors that language affects consumers' purchasing decisions, but this paper only discusses some of them, so the conclusion may not be comprehensive enough. Secondly, the current study used adapted scales to measure the credibility and appeal of two types of persuasion strategies, and future studies may first establish a solid scale or use experiments to test the hypotheses more rigidly. Thirdly, according to the data collected by the questionnaire, most of the participants are aged between 21 and 30, and the sample data are mainly young people, which is relatively limited. Future research can examine more people of different ages to improve and expand the sample data. Lastly, the model constructed in this study is a variable extracted from Aristotle's three appeals of persuasion theory, which may only partially summarize and explain Aristotle's rhetoric theory. Future research can build unique variables based on "ethos," "logos" and "pathos" for measurement, and get more accurate results.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

Author contributions

XS and ZZ contributed to the hypothesis, collection of data, and writing of the first draft. WZ participated in the empirical work and analyzed the data. YH guided the direction of this study and put forward suggestions for the revision and improvement of the article. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Influences of relative deprivation on health inequality of rural residents in China: A moderated mediation model

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Analyzing the relationship between individual relative deprivation and rural residents' health inequality is a deepening of the research on the social impact of individual relative deprivation. On the theoretical basis of the absolute and relative income hypothesis, using the data of China Family Panel Studies in 2018, taking other residents in the village as the reference group, this paper selects the relative income deprivation and absolute income to comprehensively quantify the generalized impact of farmers' income gap, introduces the psychological capital guidance mechanism, and constructs a moderated-mediation model for the impact of relative deprivation on the health inequality of rural residents in China from the three dimensions of self-assessment of health, mental health and physical health. The estimation results of the multi-layer model show that the relative income deprivation of rural residents has a significant impact on health inequality, among which the impact of mental health is the strongest. Compared with physical health, the mediated transmission of psychological capital has a more significant impact between the relative deprivation of rural residents and mental health. Compared with low-income groups, high-income residents can better alleviate the negative effect of income relative deprivation on psychological capital poverty and health inequality, and the regulatory effect on physical health is most significant. Therefore, China can improve the health of the rural poor through fiscal policies such as improving the tax system and strengthening the supervision of various government funds.

KEYWORDS

rural residents, relative income deprivation, health inequalities, psychological capital, mediating effect

Introduction

Since the implementation of China's reform and opening-up policy, the individual income distribution gap has been widening and the Gini coefficient value has continued to rise (Ren et al., 2021), far exceeding the international warning line. At the same time, the polarization continues to evolve between different economic development regions and income inequality shows significant regional group differences (Lee et al., 2022), with urban income inequality being lower than rural income inequality (Zhao et al., 2021). Widening income disparities can lead to greater relative deprivation (RD) in both economic and social status for relatively disadvantaged groups. Whether in small rural areas, extending to county-level areas or the entire sample in China, income inequality among rural residents increases the RD. This group is economically disadvantaged and has a much higher incidence of poverty than urban residents (Yu and Li, 2021). The surplus rural labor force is gradually moving to the cities, resulting in a thin labor force and poorer production conditions and infrastructure in the areas of origin (Solt, 2020). The majority of the rural labor force is poorly educated and has a limited choice of employment, resulting in slow income growth (Omar and Inaba, 2020). In the long run, the income deprivation among rural Chinese, exacerbated by the vicious circle, has become a social issue of widespread concern among scholars.

Safeguarding farmers' health is a prerequisite for accelerating rural economic development (Yang and Wang, 2019). In contrast, the healthcare delivery system in rural areas is still under constant development and reform adjustment, with lower accessibility and fewer quality resources (Cai et al., 2021) and a weaker environment still in need of improvement (Kozhimannil and Henning-Smith, 2021). In contrast, the new rural cooperative medical insurance introduced in China has led to changes in the budget constraints of rural households, influencing the economic resources, living arrangements, and care patterns of rural residents (Wittich et al., 2019), which has had some positive effects on their health status, but is far from adequately meeting the high level of demand for quality healthcare resources in rural areas (Cheng et al., 2018). In addition to further improving healthcare conditions in rural areas, strengthening the social security system in rural areas, and achieving full coverage of county and rural healthcare institutions (Li et al., 2021), policy options for achieving health poverty alleviation in rural areas could also start with improving income inequality (Sun et al., 2022).

Grossman (1972) was the first to investigate the factors influencing health, building on the human capital first formally proposed by Becker et al. (1964), which became the theoretical basis for later research. Among the many studies on the influencing factors of health inequalities, all show that income deprivation has a huge impact on health (Yang and Liu, 2018; Boen et al., 2020). As the number of researchers in this field continues to grow, a theoretical system comprising three main perspectives has gradually emerged: the absolute income hypothesis, the relative income hypothesis and the income inequality hypothesis. First, it is believed that it is primarily the absolute income gap that inhibits the health status of rural residents. For example, Rodgers (1979) studied the relationship between income distribution and health status using the Gini coefficient to measure income distribution in several countries. Second, it is argued that RD significantly affects the health status of rural residents and the investment in health status (including health care investment) (Homan, 2019; Abedi et al., 2021). The relative income hypothesis suggests that individuals with lower income levels than others will experience greater psychological stress and burden on their lives, and their health status will be affected (Wildman, 2021). Life expectancy increases with national income *per capita* and the most important factor influencing life expectancy may be the relative distribution of income. Thirdly, it is argued that the health status and behavior of rural residents is influenced not only by the income status of their own households, but also by the income status of other villagers in the same village (Harada and Sumi, 2020). The lower the ranking of annual *per capita* household income of rural residents' households, the lower the probability of positive cognition on their self-health status (including mental health and physical health) and actual health consumption (Chokshi, 2018); the RD effect of rural residents on their health behavior also varies depending on the absolute difference in *per capita* household income (Fan et al., 2020).

The direct impact of relative income deprivation on the health status of rural residents is now more commonly studied within the academic community (Fang and Saks, 2021), while the indirect impact mechanisms are less discussed and less well documented (Maykrantz et al., 2021). The introduction of psychological capital, a positive state of mind, has provided direction for influence mechanism research (Darvishmotevali and Ali, 2020) and has important implications for socio-economic development (Stratman and Youssef-Morgan, 2019). Related research has concluded that reducing income disparities can affect the psychological capital of the related group, and that psychological capital also has an impact on health levels (Morgan et al., 2019). So could psychological capital be an essential factor and pathway for relative income deprivation to the health levels of rural residents?

The study attempts to review, analyze and evaluate the relevant literature on the impact of RD on health inequalities, explore the existing problems, clarify the direction of development and guide the implementation of health policies for rural residents. Based on this, the RD index is selected for empirical analysis and the selection of the reference group is introduced; furthermore, the theoretical models of the relative income hypothesis and the absolute income hypothesis are applied to construct a hypothesis model to empirically test the moderating effect of average annual household income and the mediating effect of psychological capital, so as to clarify the path of RD affecting the health status of rural residents in China, with a view to enriching the existing relevant research perspectives. This study aims to provide references and empirical evidence for deepening the reform of the income distribution system in rural areas.

Hypothesis development

The impact of RD on health inequalities among rural residents may be the result of direct and indirect effects (Nesson and Robinson, 2019). First of all, RD may have a direct impact on health inequalities among rural residents. The specific analysis is as follows: First, as the annual *per capita* income of households decreases, the level of attention and demand for health consumption upgrades such as home care, health care, culture and entertainment is bound to decrease (Costa-Font et al., 2021), Compared to daily consumption products such as electrical appliances and household goods, clothing and accessories, rural residents may not value the usefulness of nutrition services such as health care, thus underestimating health care and reducing investment in higher-level needs for nutrition and health (Nie et al., 2021), including reducing the total investment and share of health care consumption.

Second, a strong sense of RD can trigger individuals to adopt deinstitutionalized or negative coping styles (Srivastava et al., 2021), specifically in the case of rural people's labor production, where they may feel relatively deprived for not receiving a commensurate quality return for the same amount of time spent working (Gu et al., 2019). As rational human beings, if a significant relative deprivation is felt over a long period of time, 'corrective' or 'compensatory' action will be taken. Although the time spent in productive labor may increase due to the reverse transmission (Song and Smith, 2019), however, as income distribution mechanisms are still inadequate at this stage, it is difficult for farmers who feel significant relative deprivation to have the same resource endowment to compete rationally to improve their situation and balance their psychological (Zhao, 2019). Ultimately, the income gap is widened due to the Matthew effect between individual farmers, which to a certain extent discourages monitoring and investment in self-health management; on the other hand, problems such as mental or physical health gaps may not be detected in time, and can only be treated passively when they become serious, thus repeatedly widening the health gap (Bittlingmayer et al., 2021), this has resulted in a generally low level of utilization, efficiency of access, and depth of coverage of rural healthcare.

Third, as the positive externalities of improved productive living conditions do not compensate for the health status of rural residents in the short term, the higher the RD level, the higher the opportunity cost for rural residents to adopt health management (Song et al., 2019), and the more likely they are to lack the motivation to improve their health and health literacy, and to choose the healthier lifestyle and medical services that suit them based on their temporary income level and social status (Cheesmond et al., 2019). In summary, the RD's direct effect on health inequalities among rural residents is likely to manifest itself as a positive amplifying utility. Based on this, the following research hypothesis is proposed:

> *H1*: Relative deprivation will directly affects health inequalities among rural residents, and this effect manifests itself as a significant contribution.

Afterwards, RD may indirectly affect farmers' health inequality by influencing residents' psychological capital characteristics, which are essentially farmers' longitudinal RD feelings with reference to their past selves or future expectations. For the same absolute amount of income, rural residents with lower RD levels are more convenient and better positioned to maintain their positive, healthy and sunny psychological profiles (Yang and Liu, 2018), they may also prefer to pursue the higher levels of need for 'respect' and 'self-fulfilment'. It is therefore an important objective of the reform of China's income distribution system to ensure a basic and stable income source for the residents, which not only reduces their worries about medical treatment, but also reduces their dependence on the government and the community, reduces their psychological stress and increases their self-esteem, and makes them more optimistic about their health (Xiong et al., 2021). Existing studies generally agree that relative income levels can have an important impact on health status through psychological mechanisms, and that an increase in the income distribution gap brings more feelings of loss and frustration to low-income groups (Richman et al., 2019), and that stress from life triggers psychological imbalance, generating negative emotions such as anxiety, pessimism, dissatisfaction and negative attitudes toward life, which eventually lead to the development of bad habits such as smoking and drug use, and in the long run, the health of low-income residents will deteriorate.

As RD increases, farmers may compress the range of social activities to reduce spending on higher-level needs, thereby increasing disconnection from society and inside-out group comparison anxiety (Isaacs et al., 2018). However, residents who reduce the health care consumption level such as health care, fertility, nutrition and medical treatment generally have low expectations on the investment benefits of health care. They may not have the power to invest in health expenditure or continue to consume more advanced and scientific nutrition and health lifestyles. Even if the consumption of medical and health expenditure is increased unconsciously, the stability of health management may still be relatively low (Peng et al., 2019).

Although these studies are helpful to understand the RD mechanism affecting the health inequality of rural residents, there are two shortcomings: first, they overestimate the RD's impact on physical health. The research shows that, due to the gradual improvement of basic medical security for rural residents in China and the substantial reduction of basic medical service costs, the impact was not as large as expected, caused by the RD impelling farmers to maintain physical health and treat non-psychological diseases (Li et al., 2018); Second, it ignores the pathways by which RD affects mental health by influencing the mood of rural residents' lives and their future expectations. As RD increases, rural residents may reduce the variety of social activities without changing the size of household health expenditures (Jalil et al., 2022), and a reduction in the variety of social activities (i.e., suppressing the demand for higher levels of health) may reduce the optimality of the allocation of health factors in rural areas (Yang L. et al., 2019), thus potentially widening health disparities among residents. Based on this, this paper argues that RD may indirectly affect health inequalities among rural residents by affecting psychological capital, and proposes the following hypothesis:

> *H2*: Relative deprivation significantly and negatively affects the psychological capital of rural residents.
>
> *H3*: Psychological capital significantly and negatively affects the health inequalities of rural residents.
>
> *H4*: Relative deprivation can indirectly and positively correlate with health inequalities among rural residents by affecting their psychological capital.

The absolute income hypothesis theory is an important perspective for understanding the psychological decision-making and behavior of relative income deprivation (Mackenbach, 2019), focusing on the differences in decision-making and behavior of households in different bands of absolute income (Li et al., 2022; Wang et al., 2022; Zhou et al., 2023). However, little attention has been paid to the moderating role of different bands of absolute *per capita* household income in the RD's impact on health inequalities among rural residents (Lyu and Sun, 2020). Overall, rural households in different ranges of household income differ in terms of demographics, employment preferences, and capital accumulation, and may show variability in health care investment when RD increases (Hastings, 2019; Yang X. Y. et al., 2019). At the same time, total household income *per capita* is closely related to the socio-economic behavior of rural households in terms of labor supply, household living environment and consumption and savings, and therefore has a significant impact on rural households' healthiness decisions and resource allocation (Kordan et al., 2019), which may lead to adjustments in the proportion and focus of rural households' inputs on health factors.

Further, in terms of absolute household income, rural households above the average level generally spend less money and time on basic livelihoods and tend to focus on higher-level needs satisfaction (Zeng and Wei, 2021), with less adjustment to basic livelihoods inputs, and thus RD may have less impact on health inequalities among rural residents at this stage. For rural households below the average level, with the increase of the proportion of the expenditure on basic living security, the effective labor force of rural households is expected to deteriorate in the future, and the family burden is gradually increasing (Sesen and Ertan, 2019). Rural residents may regard maximizing the immediate benefits of basic life as the main goal of income distribution, ignoring the development of psychological dynamics, which reinforces the inequality gap in health status. To sum up, when in different stages of absolute family income, RD may have different effects on the health inequality of rural residents.

Based on this, this paper proposes the following hypothesis:

> *H5*: The impact of relative deprivation on the health inequality of rural residents is related to the absolute family income.

> *H6*: The impact of relative deprivation on the psychological capital of rural residents is related to the absolute family income.

In summary, the following research model can be formed according to each research hypothesis (as shown in Figure 1).

Data sources, description of variables, and measurement models

Data sources

The data used in this article are from the 2018 China Family Panel Studies (CFPS). Organized by the Institute of Social Science Survey (ISSS) of Peking University, China, the survey aims to reflect social, economic, demographic, educational and health changes in China by tracking and collecting data at the individual, household and community levels, and to provide a data base for academic research and public policy analysis.

The CFPS sample covers 25 provinces/municipalities/autonomous regions in China, with a target sample size of 16,000 households, and includes all household members in the sample. All baseline household members and their future blood/adopted children, as defined by the 2010 baseline survey, are genetic members of the CFPS and are permanently tracked, with four main types of questionnaires—community, household, adult and child - and six rounds of data collected in the China Big Survey have been published to date.

To reflect the latest situation, this paper uses data from the 2018 CFPS to analyze the impact of relative deprivation on health inequalities among rural residents in China. The sample of residents in rural areas was retained, and those with missing data on important variables were removed, resulting in a sample size of 17,721 for analysis. Also, to ensure consistency of magnitude, the main continuous variables are standardized in this paper, and all data processing and empirical analysis is carried out in Stata 17.0 software. The average age of rural residents in the sample was 45.96 years old, 49.7% were male, 80.7% were married, the average household size was 4.53 persons, and the average annual household income was 16,437 yuan. The education level of the sample was generally moderate, with 20.3% illiterate or semi-literate people and 25.8% with high school education or above; the employment rate of the sample was high, with 81.8% of rural residents being employed; the participation rate of the sample in medical insurance was 85.9%, and most of them participated in China's New Rural Cooperative Medical Scheme ("NRCMS"), which has achieved a high level of coverage in rural areas.

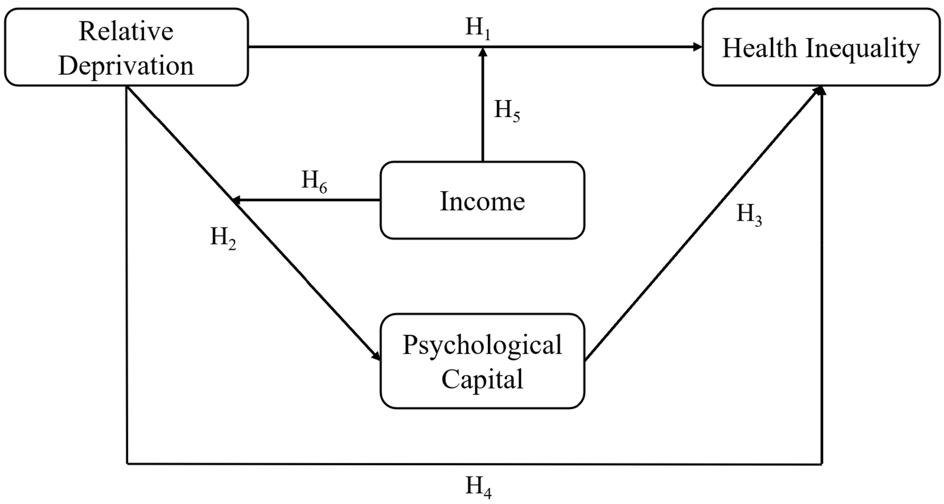

FIGURE 1
Theoretical model.

Description of variables

(1) Relative income deprivation (RID). The geographical ties in rural areas are stronger. The geographical scope, mainly focusing on villages, is concerned with the social life and communication of rural residents, and their perception of relative income is also mainly compared with villagers in the same village. Therefore, this paper uses the village as the reference unit to measure the relative deprivation of individual rural residents. According to relative deprivation theory, within a cluster, if the income level of residents is lower, the income disadvantage is greater and the level of income inequality is higher, which means the degree of income relative deprivation suffered is higher.

According to Kakwani (1980) definition of the relative deprivation index (RD for short), assuming that x represents a reference group with a sample size of n, the income vector ($x_1, x_2, \supset, x_i, x_n$)is obtained by sorting the income of farmers in the village from smallest to largest, where $x_1 \le x_2 \ldots \le x_i \le x_n$. Thus the RD index for the i th resident x_i compared to the jth resident, relative deprivation index $RD\left(x_j - x_i\right)$ for the i th resident expressed as:

$$RD\left(x_j - x_i\right) = \begin{cases} x_j - x_i \ if \ x_j > x_i \\ 0 \quad if \ x_j \le x_i \end{cases} \tag{1}$$

On the basis of Equation 1, the $RD\left(x_j - x_i\right)$ suffered by the i th resident x_i can be expressed in three forms as follows:

① The Yitzhaki Index. Yitzhaki (1979) was a pioneer in the study of RD measures, stating that individual deprivation arises from a comparison with those in the reference group who earn more than them, and is calculated as:

$$Yitzhaki = \frac{1}{n} \sum_{k=i+1}^{n} \left(x_k - x_i\right) = \gamma_{x_i}^{+} \left(\mu_{x_i}^{+} - x_i\right) \tag{2}$$

② The Deaton Index. Deaton Index builds on the Yitzhaki Index by taking into account the average income of the members of the reference group in order to satisfy the requirement of size invariance (Deaton, 2003), which is calculated as:

$$Deaton = \frac{1}{n\mu_x} \sum_{k=i+1}^{n} \left(x_k - x_i\right) = \gamma_{x_i}^{+} \left[\frac{\mu_{x_i}^{+} - x_i}{\mu_x}\right] \tag{3}$$

③ The Podder's index. In their studies, some scholars have assumed that income follows a normal distribution (Eibner and Evans, 2005), replacing income in the Yitzhaki index with income in logarithmic form, a logarithmic form of the deprivation index first proposed by Podder (1996), which is calculated as:

$$Podder = \frac{1}{n} \sum_{k=i+1}^{n} \left(\ln x_k - \ln x_i\right) = \gamma_{x_i}^{+} \left[\mu_{\ln x_i}^{+} - \ln x_i\right] \tag{4}$$

The mean income of the reference group with income over x_i is expressed as $\mu_{x_i}^{+}$, $\gamma_{x_i}^{+}$ is the percentage of the total sample whose income exceeds x_i , and $\propto_x$ is the mean income of the total sample，since the income of each individual farmer is not identical and their position on the income distribution varies (Benzeval and Judge, 2001; Deaton, 2003), the Deaton index can reflect different RD levels of residents.

④ Income quartiles. Drawing on Li and Zhu (2008), the income percentile ranking of each individual household in the village was calculated for each sample i. If the individual i 's annual *per capita* household income was the highest in the village, the income percentile ranking was taken as 100; if the individual i 's annual *per capita* household income was the lowest in the village, the income percentile ranking was taken as 0.

In summary, the Deaton Index and income quartiles, which are the most frequently used and formalized in relevant studies, were selected to measure objective RD among rural residents.

(2) Health inequalities. CFPS has more detailed questions on individual health status, and this paper selects self-rated health, mental health and physical health, which have been most widely used in the literature, to measure individual farmers' health inequalities.

① Self-rated health. Self-rated health as a measure of individual health, although highly subjective, is highly correlated with objective health indicators such as mortality (Mcewen et al., 2009), and is a comprehensive positive health indicator that is widely used, as well as being the primary dependent variable in this paper.

② Mental health. CFPS questionnaire includes a measure of mental health, Center for Epi-demiologic Studies Depression (also known as the CES-D scale), to measure residents' mental depression. In this paper, the mean of the CES depression score was calculated as a measure of mental health.

③ Physical health. In addition to the above indicators, this paper also takes reference from Li et al. (2014) and selects Physical Activity of Daily Living (PADL) limitation indicators to measure physical health of residents. This section of the CFPS survey was interviewed for the age group >45 years and this paper will construct a physical health (PADL) indicator for each activity restricted, with higher scores being associated with less restricted activity and better physical health function.

(3) Psychological capital. Psychological capital refers to the psychological state of rural residents in their productive lives, including psychological feelings about their current lives, their hopes for their future lives and their optimism when they encounter difficulties. The study chose the indicator of rural residents' confidence in their future to characterize their psychological capital.

(4) Income inequality. Considering the relevance of the absolute and relative income hypothesis theories, in addition to measuring relative income deprivation from each dimensional deprivation indicator, this paper also selects the absolute income measure of annual *per capita* household income to portray the RD's impact on health inequality.

(5) Control variables. At the individual level this paper selects variables such as age, gender, marital status, work status, years of education and health insurance, at the household level the variables of annual household income *per capita*, household drinking water and household size, and at the social level the variables of neighborhood trust, stranger trust and human relations.

Table 1 shows the information on the descriptive statistical analysis of all the variables:

Measurement models

Baseline model

The multi-layered model in this paper consists of two layers, individual and village, where the first layer is individual and the second layer is village level. The basic model is set up as follows:

$$Health\ Inequality_{ic} = \beta_0 + \beta_1 RD_{ic} + \beta_2 X_{ic} + \zeta_c + \varepsilon_{ic} \quad (5)$$

In Equation 5, health inequality is the health status of residents in village c; RD is the relative deprivation of individual i in terms of income; and X is a control variable. Among the explanatory variables studied in this paper, self-rated health status is a dichotomous variable, while mental health and physical health take values as integer variables between 8 and 32, and between 0 and 7. Therefore, this paper uses a dichotomous logistic model and a multilayer linear regression model to estimate the RD's effect on health inequalities among rural residents, respectively, with the former converting coefficient values into incidence odds for impact analysis.

$$Odds = \frac{p\left(srh_{ic} = 1 \middle| x_{ic}, \zeta_c\right)}{1 - p\left(srh_{ic} = 1 \middle| x_{ic}, \zeta_c\right)} \quad (6)$$

In this Equation 6, srh_{ic} is the outcome of self-rated health status of individual i in village c; $p\left(srh_{ic} = 1 \middle| x_{ic}, \zeta_c\right)$ is the conditional probability of self-rated health status being 'bad' and $1 - p\left(srh_{ic} = 1 \middle| x_{ic}, \zeta_c\right)$ is the conditional probability of self-rated health status being 'good'. The incidence is the ratio of the probability of a rural resident's self-assessed health status being 'bad' to the probability of a self-assessed health status being 'good'.

Mediating effects model

RD may act on farmers' health inequalities through the intermediate transmission of psychological capital. Drawing on Baron et al.'s research, a stepwise regression method was used to construct a model mediated by psychological capital, as follows:

$$HI_i = \alpha_0 + \alpha_1 RD + \sum \alpha_2 X_i + v_1 \quad (7)$$

$$PC_i = \beta_0 + \beta_1 RD + \sum \beta_2 X_i + v_2 \quad (8)$$

$$HI_i = \chi_0 + \chi_1 RD + \chi_2 PC + \sum \chi_3 X_i + v_3 \quad (9)$$

In Equations 7–9, HI is health inequality, PC is psychological capital, α_1 denotes the total effect of relative deprivation on health inequality, β_1 denotes the effect of relative deprivation on psychological capital, and the coefficient χ_2 denotes the direct effect of psychological capital on health inequality. Substituting Equation 8 into Equation 9 gives a further mediating effect $\beta_1 \chi_2$

TABLE 1 Descriptive statistical analysis.

Variable type	Variable name	Variable meaning	Mean	SD	Min	Max
Explanatory variable	Podder	RD measured using village as a reference group geographical extent (−)	8.38	1.10	0.46	12.88
	Deaton	RD measured using village as a reference group geographical extent (−)	0.40	0.26	0	1
	Percent_inc	Percentage of *per capita* annual household income in the village by village as a reference group (+)	0.50	0 0.29	0	1
Explained variable	Self-rated Health	Very unhealthy = 1, relatively unhealthy = 2, average = 3, relatively healthy = 4, very healthy = 5	2.97	1.31	1	5
	CESD	The Center for Epidemiological Studies-Depression(−)	13.80	4.11	8	32
	PADL	Physical Activities of daily living(+)	6.62	1.09	0	7
Moderating variable	Average Family income	Family income/ Family size (logarithmic)	9.28	0.93	5.01	13.85
Mediating variable	Psychological Capital	The level of confidence in your future	4.15	0.99	1	5
Individual control variable	Age	Natural age of respondents (in years)	45.96	19.64	9	100
	Gender	Female = 0; male = 1	0.50	0.50	0	1
	Marital status	Separation, divorce, widowhood, never married = 0; married, cohabitation = 1	0.80	0.40	0	1
	Work	Employed = 1, others = 0	0.82	0.39	0	1
	Education	Illiterate / semi-illiterate / not in school = 0, primary school = 1, junior high school = 2, high school / technical secondary school / vocational high school = 3, junior college = 4, bachelor's degree = 5, master = 6	1.53	1.29	0	6
	Insurance	Enroll in Medicare = 1, None = 0	0.92	0.26	0	1
Family control variable	metotal	Total medical expenditure (logarithmic)	4.86	3.45	0	12.89
	Water	Other = 0; Tap water = 1	0.62	0.48	0	1
	num_Child	Children number	4.53	2.11	1	21
Social control variable	Neighbors	The level of trust in the neighbors(1–10)	6.79	2.20	0	10
	Strangers	The level of trust in strangers(1–10)	2.12	2.21	0	10
	Interperson	Relationship quality (1–10)	7.14	2.05	0	10

of the intermediate transmission mechanism. It should be emphasized that self-rated health is a '0–1' variable, so the logit model regression. is used to regress the equation with it as the dependent variable.

Moderating effects model

To test the moderating effect of absolute annual household income *per capita* on relative deprivation and health inequality, an interaction term between relative deprivation and annual household income *per capita* was introduced and modeled as follows:

$$HI_i = \gamma_0 + \chi_1 RD_i + \gamma_2 AFI_i + \sum \gamma_3 X_i + v_4 \tag{10}$$

$$HI_i = \gamma_0 + \chi_1 RD_i + \gamma_2 AFI_i + \eta RD_i^{*} AFI_i + \sum \gamma_3 X_i + v_4 \tag{11}$$

$$PC_i = \varphi_0 + \chi_1 RD_i + \varphi_2 AFI_i + \sum \varphi_3 X_i + v_5 \tag{12}$$

$$PC_i = \varphi_0 + \chi_1 RD_i + \varphi_2 AFI_i + \mu RD_i^{*} AFI_i + \sum \varphi_3 X_i + v_5 \tag{13}$$

In Equations 10–13, AFI represents annual *per capita* household income, $RD \times AFI$ is the interaction term between relative deprivation and annual *per capita* household income, and X is a control variable.

Main results and discussion

Baseline analysis

Equations 1–3 in Table 2 report the estimated results of multi-layer logistic model regarding the effect of relative deprivation on the self-rated health status of rural residents (OR values are reported). Equation 1 shows that the RD's OR, as measured by the Deaton Index, is 0.531 less than 1 and is statistically significant at the 1% level, indicating that an increase in the ranking of rural residents in terms of relative deprivation in their village significantly reduces the log-incidence of their self-rated health status as 'good'. Equation 2 is an estimated effect of RD, as measured by the Podder Index, on the self-rated health status of rural residents, with an OR of 0.907 less than 1 and statistically significant at the 1% level, with the same practical significance as Equation 1. Equation 3 shows the estimated results of the impact of the percentile ranking of the *per capita* annual income of rural households in the village on their self-assessment health status. The OR value is significantly greater than 1, indicating that the logarithm incidence of the "good" self-assessment health status of rural people is significantly increased by 1.842% for every 1% increase in the percentile ranking of the *per capita* annual income of rural households in the village.

Table 2, Equations 4–6, report the estimated results of the multilevel linear regression model regarding RD on the mental health of rural residents. The coefficient estimates can be directly interpreted as the change in CES-D scores reflecting mental health due to changes in the independent variables. The effect of the RD, as measured by both the Deaton Index and the Podder Index, was significant with a positive coefficient, while it was equally significant with a negative coefficient on the effect of the income percentile ranking variable of the annual *per capita* income of rural residents in their village, suggesting that relative deprivation has a negative effect on the mental health of residents in rural areas. Specifically, for every 10% increase in Deaton index, rural residents' CES-D scores reflecting mental health will increase by 0.0788 points; For every 0.1 increase in the Deaton index, the CES-D score of rural middle-aged and elderly people reflecting mental health increased by 0.0292 points; The CES-D score of rural households decreased by 0.824 points for each increase in the *per capita* annual income percentile ranking of the village.

Table 2, Equations 7–9, report the estimated results of the multilevel linear regression model regarding RD on the physiological health of rural residents. The coefficient estimates can be directly interpreted as changes in PADL scores reflecting physiological health resulting from changes in the independent variables. The effects of the RD, as measured by the Deaton and Podder indices, are both significant with negative coefficients, while the effects of the income percentile ranking variable of the annual *per capita* income of rural households in their village are equally significant with positive coefficients. This suggests that RD has a negative impact on the physical health of rural residents. Specifically, for every 10% increase in the Deaton Index, rural residents' PADL scores reflecting physical health decreased by 0.0258 points; for every 0.1 increase in the Deaton Index, rural people's PADL scores reflecting mental health increased by 0.0163 points. The PADL scores of rural residents decreased by 0.416 points for every one place increase in the income percentile ranking of their village. Both self-rated health and mental health reflect respondents' subjective assessment of their own health status, suggesting that relative income disparities act directly on individuals' health status in the form of psychological stress.

Mediated effects analysis

This study first used stepwise regression to test mediating effects. First, the main effect of RD on health inequalities was tested, and as shown above, the main effect of RD on health inequalities was statistically significant; Second, individual-level variables, family-level variables and social-level variables were used as control variables, and the regression equation was established with RD as the independent variable and psychological capital as the dependent variable. The results showed that the negative predictive effect of RD on psychological capital was statistically significant ($\beta = -0.192$, $p < 0.01$). Third, controlling for individual-level, family-level and society-level variables, the independent variable RD and the mediating variable psychological capital were simultaneously placed in the regression equation, with health inequality as the dependent variable.

TABLE 2 Results of multi-layer model estimation of the RD's effect on the health status of rural residents.

Variable name	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	Self-rated health			CES-D			PADL		
Deaton	0.531***			0.788***			−0.258**		
	(0.068)			(0.196)			(0.111)		
Podder		0.907***			0.292***			−0.163***	
		(0.028)			(0.071)			(0.044)	
Percent _inc			1.842***			−0.824***			0.416***
			(0.213)			(0.174)			(0.101)
age	0.959***	0.961***	0.957***	0.028***	0.028***	0.027***	−0.012***	−0.012***	−0.012***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
gender	1.288***	1.268***	1.325***	−0.387***	−0.361***	−0.374***	−0.049	−0.054	−0.052
	(0.087)	(0.087)	(0.088)	(0.101)	(0.097)	(0.098)	(0.061)	(0.060)	(0.061)
marri	0.969	0.977	0.961	−0.972***	−0.917***	−0.894***	0.176**	0.141*	0.154*
	(0.088)	(0.089)	(0.086)	(0.128)	(0.122)	(0.123)	(0.087)	(0.084)	(0.086)
work	1.305***	1.351***	1.235**	−0.226*	−0.267**	−0.244*	0.728***	0.744***	0.755***
	(0.111)	(0.117)	(0.103)	(0.134)	(0.128)	(0.129)	(0.078)	(0.076)	(0.077)
Education	1.124***	1.146***	1.107***	−0.189***	−0.168***	−0.162***	0.044**	0.037**	0.031
	(0.021)	(0.022)	(0.021)	(0.029)	(0.029)	(0.029)	(0.019)	(0.019)	(0.019)
insurance	1.001	1.019	0.949	−0.445**	−0.507***	−0.503***	−0.080	−0.080	−0.093
	(0.118)	(0.121)	(0.110)	(0.174)	(0.166)	(0.167)	(0.107)	(0.104)	(0.105)
water	1.031	1.057	1.025	−0.130	−0.121	−0.121	0.075	0.073	0.090
	(0.069)	(0.071)	(0.067)	(0.100)	(0.097)	(0.097)	(0.060)	(0.059)	(0.060)
num_child	1.162***	1.151***	1.162***	−0.253***	−0.230***	−0.228***	0.008	0.002	0.005
	(0.049)	(0.049)	(0.048)	(0.073)	(0.071)	(0.072)	(0.026)	(0.026)	(0.026)
metotal	1.000***	1.000***	1.000***	0.000***	0.000***	0.000***	−0.000**	−0.000**	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Neighbors	1.085***	1.082***	1.081***	−0.233***	−0.236***	−0.228***	0.007	0.005	0.004
	(0.017)	(0.017)	(0.016)	(0.024)	(0.023)	(0.023)	(0.013)	(0.013)	(0.013)
Strangers	1.044***	1.042***	1.042***	−0.032	−0.033	−0.037*	0.013	0.012	0.014
	(0.016)	(0.017)	(0.016)	(0.023)	(0.022)	(0.022)	(0.013)	(0.013)	(0.013)
Interperson	1.056***	1.058***	1.061***	−0.188***	−0.185***	−0.190***	0.008	0.010	0.011
	(0.017)	(0.017)	(0.017)	(0.025)	(0.024)	(0.024)	(0.014)	(0.014)	(0.014)
Pseudo R2	0.124	0.119	0.122	0.081	0.078	0.078	0.123	0.126	0.129
N	6,212	5,892	6,585	6,198	6,633	6,571	1,492	1,543	1,518
Log likelihood	−3,036	−2,922	−3,175	−16,999	−18,169	−17,992	−2,268	−2,342	−2,311

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

The results showed that the positive predictive effect of psychological capital on self-rated health was statistically significant ($\beta = 0.336$, $p < 0.01$, $R^2 = 0.102$), and the negative predictive effect of RD on self-rated health increased ($\beta = -0.928$, $p < 0.01$, $R^2 = 0.116$).Thus, psychological capital partially mediated the effect of RD on self-rated health; the negative predictive effect of psychological capital on mental health was statistically significant ($\beta = -0.996$, $p < 0.01$, $R^2 = 0.128$), and the positive predictive effect of RD on mental health was enhanced ($\beta = 1.405$, $p < 0.01$, $R^2 = 0.127$).Thus, psychological capital partially mediated the effect of RD on mental health; the positive predictive effect of psychological capital on physiology was statistically significant ($\beta = 0.092$, $p < 0.01$, $R^2 = 0.091$), and the negative predictive effect of RD on physiological health was enhanced ($\beta = -0.407$, $p < 0.01$, $R^2 = 0.124$).Therefore, psychological capital partially mediates the effect of RD on physical health; thus, hypothesis 2, hypothesis 3, and hypothesis 4 are supported.

The results of further Bootstrap analysis (Table 3) showed that the 95% confidence intervals for the direct and indirect effects of psychological capital in the process of income deprivation on the self-rated health were −0.231 to −0.169 and −0.019 to 0.009, respectively, with confidence intervals not containing 0, indicating that both the direct and indirect effects were both significant, which suggests that psychological capital partially mediates the process by which it influences self-rated health. Similarly there is a partial mediating effect of psychological capital between mental health and physical health. The mediating effects of self-rated

TABLE 3 Analysis on the mediating effect played by psychological capital.

Explanatory variable	Effect type	Effect value	Standard error	95% CI	Effect proportion
Psychological Capital to self-rated health	Direct effect	−0.200	0.015	[−0.231, −0.169]	93.3%
	Indirect effect	−0.014	0.003	[−0.019, −0.009]	6.7%
Psychological Capital to CESD	Direct effect	1.405	0.035	[0.117, 0.256]	88.3%
	Indirect effect	0.186	0.138	[1.135, 1.675]	11.7%
Psychological Capital to PADL	Direct effect	−0.018	0.005	[−0.027, −0.008]	95.8%
	Indirect effect	−0.407	0.044	[−0.493, −0.322]	4.2%

TABLE 4 Regulated mediating effect test.

Variable	Model 10	Model 11	Model 12	Model 13
	PC	SRH	CESD	PADL
Podder	−0.169***	−0.732***	−0.262***	0.427**
	[−0.243, −0.094]	[−0.952, −0.512]	[−0.449, −0.076]	[0.025, 0.828]
AFI	8.46e-07*	8.60e-06***	−0.265**	0.621***
	[−1.48e-07, 1.84e-06]	[3.83e-06, −1.34e-05]	[−0.319, −0.212]	[0.495, 0.748]
Podder * AFI	0.235***	2.35e-05***	−0.061	−0.301***
	[0.171, 0.298]	[−1.08e-05, −3.63E-05]	[−0.165, 0.043]	[−0.517, −0.084]

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. PC indicates psychological capital, SRH indicates self-rated health, CESD indicates The Center for Epidemiological Studies-Depression, PADL indicates physical activities of daily living, and AFI indicates average family income.

health, mental health and physical health accounted for 6.7%, 11.7%, and 4.2%, respectively. In summary, the mediating effect of psychological capital on mental health is more significant than that of self-rated health and physical health.

Moderating effects analysis

This study used hierarchical regression to test the moderating effect of the absolute income amount on direct effect. The steps are as follows: ① health inequalities (categorized as self-rated health, mental health and physical health) are used as the dependent variables and control variables (individual control variables, family control variables and social control variables) are placed into the regression equation. ② put the independent variable RD into the regression equation; ③ put the moderating variable mean annual household income into the regression equation; ④ put the interaction term of the centralized RD and average family income(AFI) into the regression equation.

As shown in Table 4, the interaction terms for RD and absolute income were statistically significant predictors of psychological capital (Model 10: $\beta = -0.169$, $p < 0.01$, $R^2 = 0.096$). This suggests that absolute income moderates the relationship between RD and psychological capital and has a negative effect on the original effect, which means higher absolute income of rural residents reduces the negative effect of RD on psychological capital, and Hypothesis 5 was verified. Similarly testing the moderating effect of absolute income on the total effect (as shown in Table 4), the interaction term between RD and absolute income was statistically significant in predicting self-rated health, physical health (Model 11: $\beta = -0.732$, $p < 0.01$, $R^2 = 0.103$; Model 13: $\beta = 0.427$, $p < 0.01$, $R^2 = 0.115$), and not mental health.This suggests that AFI has a moderating effect on the relationship between RD and self-rated health and physical health, both of which are negative, while the moderating effect on mental health is not significant, which means higher absolute income of rural residents reduces the negative effect of RD on self-rated health and physical health, and Hypothesis 6 were partially verified.

Research discussion

Conclusion

This study introduces psychological capital variables to investigate the relationship between relative income deprivation and health inequalities among rural residents. Based on two theories of income inequality, the absolute income hypothesis and the relative income hypothesis, the study comprehensively examines the association between income deprivation and health inequality under various forms, and further reveals the moderating effect of absolute income amount and the psychological capital-mediated transmission pathway, with the following findings:

First, relative income deprivation among rural residents can be significantly associated with health inequalities, with the strongest association being for mental health. In line with Nesson and Robinson's (2019) argument for the association between income inequality and health inequality, the findings are similar to those of Richman et al. Thus, improving the country's urban and rural income distribution system can reduce the income gap between residents. A fairer and more scientific income distribution and redistribution policy can be formulated to reduce the income inequality between urban and rural areas as well as within them as much as possible, thus improving the overall health of the residents. At the same time, due to the uneven development between regions in China, there is a significant income gap and some low-income groups still bear high medical costs, so it is necessary to increase financial investment in healthcare so that low-income groups can also enjoy basic medical treatment.

Second, the effect of psychological capital mediated transmission was more significant between relative deprivation and mental health of rural residents compared to physical health. The findings are consistent with existing research, confirming the significant relationship between relative deprivation, psychological capital and health inequalities (Darvishmotevali and Ali, 2020; Maykrantz et al., 2021). A higher perception of individual income relative deprivation is not conducive to promoting the accumulation of psychological capital and the health status of the population, which stems from a psychological state in which individuals perceive that their benefits are being appropriated and taken away from them with reference to others or other groups, and this psychological stimulus leads to psychosocial imbalances. The higher the perception of poverty, the more negative the psychological impact, creating a certain hatred of the rich, which in turn generates negative emotions and thus affects their health status. If properly guided so that individuals can accept the existence of fair income deprivation, this will not only increase cohesion and identity among residents, but will also improve social integration and promote the physical and mental health of individuals. It also enhances interpersonal cohesion and communication, as well as social status, which can contribute to improving one's social capital and one's own health status.

Third, higher income resident groups can better mitigate the reinforcing effects of relative income deprivation on psychological capital deprivation and health inequalities compared to lower income groups, where the moderating effect on physical health is more significant. The findings are consistent with those of Lyu and Sun (2020). Since the absolute income of rural residents has a significant contribution to health status, on the one hand, we can increase the added value of agricultural products by increasing the income sources of rural residents, providing advanced technical support and working conditions for agricultural production, gradually moving down labor-intensive industries to create more labor jobs, reducing the cost of increasing income for rural residents, broadening the marketing channels of agricultural products, and extending the industrial chain of agricultural products. On the other hand, active measures are also being taken to promote the high-quality transfer of surplus rural labor, to increase the income levels of rural residents and to narrow the income gap between them and urban residents.

Theoretical implications

The research in this paper has some theoretical implications for the introduction of psychological variables into economic sociological research. Most of the existing studies only describe the health status of rural residents from a single dimension, and lack of systematic theoretical analysis (Galloway and Henry, 2014; Li et al., 2014; Guo et al., 2022). Based on the combination of theory and empirical evidence, this paper designs a psychological mediation model that can explore the heterogeneity of relative deprivation on different dimensions of health from the introduction of psychological capital as a psychological perspective, further enhancing the feasibility and applicability of the theoretical model of health behavior in the field of psychobehavior, and providing some basis for further in-depth research. It will be helpful to enrich the existing relevant research and provide a certain basis for further in-depth study. At the same time, focusing on the moderating effects of income, this paper analyzes the influence of absolute income, relative income and income inequality on the health of rural residents, and excavates the deep-seated factors that affect the health level of rural residents, it fills the blank of this field and is innovative to a certain extent.

Practical implications

The findings of this paper have certain policy implications. This paper shows that relative deprivation based on income has a negative impact on the health status of rural residents, and that relative deprivation due to income inequality further exacerbates the health problems associated with rural income disparities. Therefore, deepening the reform of rural income distribution is the most crucial aspect of achieving rural health care. In addition to strengthening the health care and social security systems in rural areas, deepening the reform of the income distribution system in rural areas can also alleviate, to a certain extent, the health problems of rural residents brought about by social development phenomena such as urban–rural regional disparities and population ageing. The study can thus provide some practical basis and effect predictions for measures related to the effects of fiscal policy to improve the health of deprived people in China, such as improving the taxation system, strengthening the supervision of various government funds, and realizing tax relief policies for some people with financial difficulties or special circumstances.

Limitations

This paper has some limitations. Firstly, it is limited to the original data of the research sample, and only a single indicator is selected to measure psychological capital. Although it can explain psychological capital to a certain extent, it has not yet reached the ideal state of multi-dimensional measurement, which may have some impact on the accuracy of the results. The paper also uses only psychological capital variables as mediating variables and does not analyze the mediating role of other factors such as social capital, which should be further verified by structural equation modeling in the future. In addition, this paper does not analyze in depth the effect mechanism of relative income deprivation on the health of different types of residents. Further heterogeneity analysis on different genders, different age stages, and different geographical areas will provide more scientific and precise evidence to support the research on this topic in the future.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Author contributions

CT contributed to the model building as well as the article writing. JX and RT cooperated with all of CT's work and contributed to the empirical analysis and text writing. ZW and JL contributed to the overall quality of literature organization and article revision. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Can visual language convey tactile experience? A study of the tactile compensation effect of visual language for online products

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Introduction: There is a common phenomenon of tactile missing in online retail. How to realize consumer tactile compensation is a consensus problem in the field of e-commerce. More and more marketeers and scholars convey their ideas via visual display, but few researches have focused on the tactile compensatory effect of visual language.

Methods: Study 1 collected data from nearly 13,000 online purchases to analyze the impact of haptic cues on sales in real online shopping platforms; Study 2 used a experimental research method to design three experimental groups: hand haptic cue group vs. Object haptic cue group vs. control group (N = 165) to investigate whether the main effect of haptic cues and the dual mediating effect of mental simulation held. Study 3 also adopted a simulated experimental research approach to design a two-factor group: 2 (haptic cue: hand vs. object) × 2 (product type: tactile functional product vs. tactile experiential product) (N = 198). To further explore whether the moderating effect of product type holds based on Study 2.

Results: Therefore, based on the visualization theory and mental simulation theory, and through a second-hand data experiment and two simulated experiments, this study confirmed that visual language did have a compensation effect on tactile missing specifically. Haptic cues in metaphorical visual language can actively compensate for consumers' tactile loss, thus affecting the purchase intention. Mental simulation plays a mediating role in the tactile compensation effect. Product type has a moderating effect, and the use of hand (object) haptic cues in metaphorical visual language in tactile functional products (tactile experiential products) can lead to a more active purchase intention.

Discussion: This study not only enriches the theoretical research on the tactile compensation effect of visual language, but also provides valuable management enlightenment for e-commerce enterprises to improve the effectiveness of online product display and online sensory marketing strategies.

KEYWORDS

visual language, tactile compensation, visual metaphor, online product display, mental simulation, haptic cues

Introduction

The competition in the online retail market gets more intensified due to the global COVID-19 epidemic (Yi et al., 2022). New technologies represented by the Internet, new media, cloud technology, and big data have become new driving forces for the development of media companies (Waheed et al., 2021; Yi et al., 2021), and non-contact consumption will gradually become the main consumption pattern in the post-epidemic era. Non-contact consumption makes consumers unable to truly touch products online before purchase, thus, lacking sensory experience (Yoo and Kim, 2014) and triggering great uncertainty about their purchase intention and behavior (Rathee and Rajain, 2019). Therefore, how to remedy the negative consequences caused by the naturally existing sensory barriers of e-commerce is a recognized key issue in academics. Online retailers should create an appropriate online shopping environment and develop effective visual language marketing strategies (Zheng et al., 2019) to give consumers a perfect connection between online and offline shopping experiences (Liao and Yang, 2020; Frasquet et al., 2021; Jai et al., 2021).

Online retail products primarily display *via* visual language. In this context, online consumers are unable to touch the products physically, thus, leading to heavy dependence on online sensory experience (Herz and Diamantopoulos, 2017). From the perspective of the visual language, the existing studies suggest designing visual elements containing rich tactile information to offer sensory compensation to consumers (McCabe and Nowlis, 2003; Yoo and Kim, 2014; Rodrigues et al., 2017), such as appropriate image sizes (Cornil and Chandon, 2016), vivid images to induce tactile imagery (Park, 2006), and product images with tactile information descriptions (Silva et al., 2021), to induce virtual tactile perception for tactile compensation *via* the visual language of images. However, the visual language display mentioned in existing studies is limited to the product itself, and few studies pay attention to other visual elements outside the product, such as the positive effects of haptic cues' tactile compensation (Chen et al., 2019; Maille et al., 2020). Most of the existing research focuses on the tactile properties of products and product packaging and does not consider how haptic cues in visual language can encourage people to understand tactile properties in a metaphorical way, so as to achieve the purpose of tactile compensation. Additionally, the majority of previous investigations (Luangrath et al., 2022) have concentrated on the compensating effects of a single type of haptic cue and have not examined the possibility that tactile compensation might be achieved with various types of haptic cues. The innovative point of this paper is to delve into how online retailers can effectively design visual language, i.e., to explore designing strategies for various haptic cues types in online product displays. Through haptic cues in metaphorical visual language (i.e., MVL), the metaphorical presentation promotes consumers' awareness of product haptic attributes and explores the positive effects, psychological mechanisms, and implementation strategies for conveying online product haptic attributes and experiences to consumers, which can be applied to the study of online consumer behavior and psychology. This paper can not only promote the research on the tactile compensation strategy of online products but also provide valuable guidance for e-commerce enterprises to implement online sensory marketing strategy.

Literature review and hypotheses development

Theoretical basis

Touch visualization theory

Neurophysiological studies have found that both tactile and visual modes share a common neural basis in the representation of external stimuli (Sathian, 2016). Further research in cognitive psychology suggests that the information observed through vision can simulate the sense of touch. This is a phenomenon known as the visual-tactile mirror mechanism (Keysers et al., 2004; Katsuyama et al., 2018; Zazio et al., 2019). Accordingly, touch visualization theory suggests that observing another person being touched, seeing an object being touched, or even any visual touch (such as a tree branch beating against a window glass) can lead to the activation of the tactile nervous system involved in the individual somatosensation (Ebisch et al., 2008; Tholen et al., 2020). The touch-sharing mechanism will be activated when watching another hand or an object being touched (Kuehn et al., 2018), meaning that participants actually perceived the haptic stimulus of their hands being touched (Kimura and Katayama, 2018; Zazio et al., 2019). This mechanism also further creates a "tactile empathy effect" (Ward et al., 2018). Thus, vicarious touch experience caused by visual touch can help individuals get physical feelings, emotional states, and emotional attitudes just like in actual touch (Ebisch et al., 2008; Fahey et al., 2019; Zeugin et al., 2020).

Mental simulation theory

Mental simulation refers to the imaginary representation of some events and the function or process of a series of events. It is the simulated reappearance of the event in consumers' minds or the vicarious experiences of the described event (Taylor and Schneider, 1989). Mental simulation can be conceptualized as an automatic and unconscious form of mental imagery involving the cognitive construction of virtual situations and reconstruction of real situations and associating with the activation of brain regions involved in processing real perceptual information (Elder and Krishna, 2012). Its main function is to improve action readiness and behavior provision, and further affect individual cognition, judgment, and behavior (Lee and Choi, 2022). For example, displaying products of a tactile attribute in visual language (Park and Yoo, 2020) or verbal descriptions of target objects or extrinsic sensory cues induce the individuals to initiate their mental simulations (Lv et al., 2020), which will facilitate subsequent behavior. Therefore, mental simulation is a marketing strategy often used by marketers to attract consumers' attention and encourage participation, thus changing consumer behavior (Choi et al., 2020).

Hypotheses development

The influence of metaphorical visual language haptic cues on consumers' purchase intention

Visual language has been defined differently in many fields (Erwig et al., 2017). This study follows the definition of visual language by Kahn (1996) and Strothotte and Strothotte (2012). In a broad sense, any type of non-textual visual communication medium (including art, images, maps, and charts) can integrate visual elements into a unified communication unit, and a visual language is formed. The cognitive availability advantage of visual language comes from its picture characteristics (Blackwell, 1996). Individuals process visual language with approximately 20 billion brain neurons to help them analyze quickly and integrate relationships into visual elements in terms of visual structure (Malamed, 2009; Emanuel and Challons-Lipton, 2013), thus, people have a sufficient cognitive basis and cognitive advantages *via* visual language (Green and Petre, 1996; Blackwell et al., 2001). Visual language has long been widely used in marketing. For example, retailers design different visual languages on packaging to make people perceive their product difference (Vila and Ampuero, 2006; Vollenbroek, 2021) and to influence people's judgment and attitude toward products (Chrysochou and Grunert, 2014; Delivett et al., 2020).

Visual structures employed in visual language include metaphor (Blackwell, 2001), hyperboles (Schilperoord and Maes, 2010), and ellipsis (Van Mulken et al., 2014). As an important auxiliary means for people to understand visual language, a metaphor compares two different visual elements, indicating when one object is similar to another one (Jeong, 2008), the "similarity" between two visual elements will be highlighted in the same visual language (Phillips and McQuarrie, 2004; Lagerwerf et al., 2012). Consumers usually carry out the best perceptual organization of different objects with parallel perception according to the similarity law and law of contiguity. Thus, the metaphor or the link of relative concepts between them can be recognized and inferred (Schilperoord et al., 2009). Existing research confirms that presenting MVL can help people construct relevant visual language processing programs in their psyche and mind, understand the meaning conveyed by visual language (Blackwell, 2001), provide people with near-authentic tactile information (Ghosh and Sarkar, 2016), and further influence people's purchase intentions and brand attitudes toward the target product among others (Fenko et al., 2018; Margariti et al., 2019; Myers and Jung, 2019). Therefore, the two visual elements of the MVL defined in this study refer to the product element and the metaphorical element, with the product element being the target product image and the metaphorical element invoking the haptic cues in the text, both of which are metaphorically juxtaposed in the visual language display.

According to the theory of touch visualization, real haptic perception can be generated when an individual watches the intentional or unintentional touch between living or inanimate objects, thus, emerging vicarious touch experience (Keysers et al., 2004; Schirmer and McGlone, 2019). In e-commerce practice, online retailers often rely on MVL by designing relevant haptic cues in the display of the target product, such as a hand touching the product or an object with significant tactile properties, in order to express and convey the tactile properties of the target product visually and concretely. On the basis of the concept of Luangrath et al. (2022), vicarious touch is conceptualized as the touch between the haptic cues in MVL in picture display and the product, so that consumers can have a nearly real tactile experience. In this paper, haptic cues are specifically divided into hand haptic cues and object haptic cues (Ebisch et al., 2008).

Different haptic cues have different effects on consumers' understanding of the nature and strength of online products' tactile attributes, which leads to differences in behavioral intentions. The "placebo" effect indicates that irrelevant or non-diagnostic information will affect consumers' judgment (Shiv et al., 2005; Brasel and Gips, 2014; Abrate et al., 2021). Therefore, attention to haptic cues in MVL can be transferred to target products to a certain extent. Consumers are able to shift this attention to some extent to the target product, evoking a mental simulation of the target product (Herrero et al., 2022), enhancing the perceived tactile attributes of the product (Biswas and Szocs, 2019), and influencing subsequent perceptions of product quality, brand attitudes, and purchase intentions (Yoganathan et al., 2019; Donato and Raimondo, 2021). Thus, when haptic cues in MVL are objects, through demonstrating haptic properties significantly related to objects, consumers can actually feel product haptic properties based on vicarious touch experience and transcendental knowledge get from haptic properties and quality and promote a positive attitude. For example, Lv et al. (2020) and Maille et al. (2020) proved that product images with haptic cues could stimulate the mental simulation and purchase intention of the subjects through the manipulation of haptic cues such as feathers, brushes, or wine glasses than straightforward product displays. From the perspective of consumers' online environment feelings, haptic cues of heavy and soft objects affect both the warmth and ability dimensions of online retailers, thus influencing purchase intention (Jha et al., 2019). When the haptic cue is hand, i.e., when showing the image of the target product touched by the hand, with the help of metaphorical rhetorical techniques to simulate the process of exploring the tactile properties of the product by consumers themselves using their hands, this vicarious touch experience makes it a real touch experience. Lederman and Klatzky (1987) showed that the initiative and diagnostic hand exploration process (EPs) can be mapped to the tactile system and extract relevant haptic information. Additionally, in the context of observing others' hand touch online, touching products with others' hands leads to increased somatosensory activity in brain regions (Basso et al., 2018) and vicarious experiencing (Luangrath et al., 2022). Studies in cognitive psychology and consumer behavior have shown that observing hand haptic cues and product touch could stimulate vicarious touch experience. The process of automatically simulating others' hand-touch actions appears psychologically and behaviorally (Liu et al., 2018), even if the subjects rationally judge that the behavior does not come from themselves (Wegner et al., 2004). This vicarious sensory experience also helps to infer its sensory characteristics and obtain sensory information about products (Pino et al., 2020), thereby enhancing purchase and payment intention (Luangrath et al., 2022).

Gkiouzepas and Hogg (2011) proposed conceptual tension to explain the contiguity of metaphorical conceptual links, i.e., the degree of correlation between two metaphorical objects (concepts). Our study refers to the conceptual tension between the two metaphorical objects of the haptic cue and the target product. When the metaphorical targets displayed in visual language are closely related to each other, such as when haptic cues are closely linked to the target product in terms of tactile properties, the metaphorical degree of conceptual tension may affect their metaphorical quality (McCabe, 1983), i.e., the smaller the conceptual tension between two metaphorical targets (concepts), the more familiar the individual is to the source domain. Therefore, compared to two metaphorical objects with high conceptual tension two metaphorical targets, with less conceptual tension can help individuals perceive metaphorical representation from the whole and enhance their episodic memory of metaphorical pictures (Gurguryan et al., 2021), and the quality of perceived visual metaphors will be better (Pollock, 2020). Thus, compared with haptic cues of objects, haptic cues of hands and products have closer conceptual links and less conceptual tension. This is because the hand is one of the most sensitive parts of the human body, as suggested by Penfield touch dwarf theory (Sekuler and Blake, 1994), and it is the haptic "window" for exploring objects (Klatzky et al., 1993). In addition, touching products are very active in nature. Therefore, people are familiar with how to judge and experience the tactile properties of products through hand touch (Luangrath et al., 2022). Studies have shown that when people see the virtual hand or real rubber hand touching objects, they begin to feel that the virtual hand (Moseley et al., 2008; Slater et al., 2009) and the rubber hands (Ehrsson, 2020) are their own hands, and "tactile transmission" phenomenon occurs, which reduces consumers' distance with the rubber hand or virtual hand and blurred the boundary with the body, thus, promoting vicarious tactile experience. Therefore, people are more familiar with the haptic cues of the hands than with haptic cues about objects. Then the conceptual tension of metaphor containing hand haptic cues is smaller than object haptic cues, and people are more likely to accept and understand these tactile attributes and experiences conveyed by these hand haptic cues in MVL. To sum up, the following hypothesis is proposed:

> H1: Online products containing haptic cues in MVL, compared with haptic cues of objects, haptic cues of hands can lead to more positive purchase intention.

The mediating effect of mental simulation

It is easier to activate rich sensory information stored in working memory through metaphor presentation, such as recently perceived stimulus images, or sensory images possibly extracted from long-term memory (Abaidi et al., 2020). Thus, MVL can convey the richness and vividness of tactile information, and visual language containing rich sensory information is more effective than other stimuli in evoking mental simulation (Lee and Gretzel, 2012; Liu et al., 2019;

Lee and Choi, 2021). Embodied simulation neuroscience model indicates that individuals conceptualize observed things based on their own body–related perceptual experiences (Gallese, 2005; Tan, 2020) and create cognitive psychological shortcuts. Therefore, both hand haptic cues and object haptic cues contain abundant tactile information and can represent consumers' apriority tactile experience. Forming from the metaphor of structure mapping instead of tactile experience, the vicarious tactile experience can help consumers quickly get conceptual cognition of online product tactile properties, thus, effectively stimulating mental simulations (Chen and Lin, 2021; Yim et al., 2021).

Mental simulation can be distinguished into two elaboration types: process simulation and outcome simulation (Zhao et al., 2007). Process simulation involves imagining the process, emphasizing the actions necessary to achieve the results, and encouraging the formation of plans through step-by-step stories or narratives. People who are more focused on process simulation are better at reinforcing product knowledge and will concentrate more on relatively precise means (Rennie et al., 2014) and techniques to accomplish their objectives (Agrawal and Wan, 2009). While outcome simulation involves people's imagination of the outcomes of events, emphasizing the outcomes that people expect to occur when they imagine achieving their goals (Taylor et al., 1998; Wu et al., 2021). People who are more focused on outcome simulation are more likely to exhibit impulsive behavior in reaction to stimuli (Rennie et al., 2014), and they concentrate on outcomes that are vague and abstract (Agrawal and Wan, 2009). Process simulation and outcome simulation facilitate the visualization of product adoption decisions (Castaño et al., 2008), focusing on the "how" and "why" modes of thinking, respectively. When the type of mental simulation matches the processing mode, the target, or the memory of previously stored information, mental simulation can play the most concrete role (Zhao et al., 2011). Haptic cues in MVL facilitate each of these two mental simulations. Process simulation focuses on the process of enjoying the experience. When consumers attach importance to the experience process of products, they tend to touch and explore with their hands. Hand cues in MVL can maximize the stimulation of process simulation (Yim et al., 2021), such as the softness of towels. While outcome simulation focuses on the benefits of the tactile experience. When consumers think highly of product outcome information, object cues in MVL can maximize outcome simulation (Xie et al., 2016).

Mental simulation of previous experience triggered by external cues can influence consumers' expectations of the product, experience, and evaluation (Papies et al., 2017). Persuasive information that evokes stronger imagery, such as information containing multisensory modality, can strongly induce mental simulation, thereby initiating strong product attitudes and behavioral intentions (Chen and Lin, 2021). Thus, haptic cues in MVL of products can effectively stimulate process simulation and outcome simulation (Xie et al., 2016) and influence preferences, attitudes, and behavioral intentions (Chang, 2012; Petit et al., 2017, 2018). Therefore, the following hypothesis is proposed:

> H2: Mental simulation plays a mediating role in the influence of haptic cues in the MVL of products on consumers' purchase intention. Among them, process simulation mediates hand haptic cues and purchase intention, and outcome simulation mediates object haptic cues and purchase intention.

The moderating effect of product type

Based on the division of product types in existing studies, products are divided into functional products and sensory-social products (Bettiga et al., 2020). Functional products are instrumental and practical, and consumers need to think, analyze, and process the attributes of the products, including products with functional purposes (such as electronic products and water cups) (Zhu and Meyer, 2017), and their potential purchase motivation is the material functional attributes maximization (Daugherty et al., 2008). This kind of product is the most suitable for collecting geometric information such as shape attributes and haptic information such as weight (McCabe and Nowlis, 2003; Jang and Ha, 2021). With sensory-social products, consumers focus on self-expression and sensory pleasure and usually attach personal emotional factors. When the most important sensory attribute of sensory-social products is touch, it is difficult for consumers to evaluate their haptic attributes before purchasing. Such as texture dimension-related information, which needs to be verified by real touch exploration (Casasanto, 2009; Milhau et al., 2017; Ranaweera et al., 2021). Therefore, according to the different roles of sensory information such as MVL haptic cues in functional products and sensory-social products, products can be divided into tactile functional products and tactile experiential products (Bettiga et al., 2020; Karangi and Lowe, 2021). Processing fluency is defined as the ease with which information is processed (Alter and Oppenheimer, 2009). The theory of processing fluency indicates that individuals automatically form self-perception of the difficulty and fluency of processing information (Shapiro, 1999; Murphy et al., 2022), allowing individuals to form self-preference judgments and emotional responses to processed information (Carr et al., 2016), which are primarily related to people's mental conceptual fluency and perceptual fluency (Lee and Labroo, 2004; Dreisbach and Fischer, 2011). When people develop higher mental fluency and perceptual fluency for processed information, it is beneficial for people to select, evaluate, and make corresponding purchases of processed information (Winkielman and Berridge, 2003; Alter and Oppenheimer, 2006; Novemsky et al., 2007). When the MVL information is consistent with the relevant attributes of the product, the processing fluency of consumers will be improved and they can quickly process the corresponding sensory information (Chen and Lin, 2021), which can influence subsequent behavior. Therefore, tactile functional products highlight instrumental tactile information through tactile interaction between objects' haptic cues in MVL and tactile functional products, so that consumers can quickly identify tactile attributes, extract tactile information, produce outcome simulation, and promote their purchase intention without realizing it. For tactile experiential products, tactile information is collected through hand-touch exploration (Bergmann Tiest et al., 2012) and familiarity is enhanced (Yim and Yoo, 2020). Tactile vicarious experience is provided to reduce perceptual risks and enhance a pleasant shopping experience (Cano et al., 2017). Thus, the interaction between hand haptic cues and tactile experiential products can meet the demand for touching products, which is in favor of generating process simulation and promoting purchase intention. In conclusion, the following hypothesis is proposed:

> H3: Product type plays a moderating role in the influence of haptic cues in MVL on consumers' purchase intention. Among them, tactile experiential (tactile functional) products in significant tactile attribute products display using hand (object) haptic cues will lead to positive purchase intention.

The theoretical model of this paper is shown in **Figure 1**.

Methodology

Study 1: Online shopping platform real data analysis

Pre-study

Before starting the experiment, all the products needed for the experiment should be determined. In the first step, subjects were asked to evaluate product attributes considered when purchasing the product and score the importance of tactile and visual information in product evaluation and decision-making. Combining the product categories used in the previous studies, 30 products sold online were selected first. Referring to the experimental procedure of Balaji et al. (2011) on the pre-test of product types, 40 undergraduates from a university in China were invited. It was assumed that the importance of tactile information (TI) and visual information (VI) was rated from extremely unimportant (1) to extremely important (5) according to a Likert 5-point scale in the decision of purchasing these products. Statistical results showed that 12 kinds of products were tactile diagnostic products, including pyjamas (N = 40, TI = 4.90, VI = 3.85, $p < 0.001$), dumbbells (N = 40, TI = 4.48, VI = 2.80, $p < 0.001$), blankets (N = 40, TI = 4.90, VI = 4.10, $p < 0.001$), gloves (N = 40, TI = 4.85, VI = 3.80, $p < 0.001$), pinch meter (N = 40, TI = 4.48, VI = 2.50, $p < 0.001$), and scarf (N = 40, TI = 4.78, VI = 4.50, p = 0.020).

In the second step, tactile diagnostic products were further divided into tactile functional products and tactile experiential products. Fifty undergraduates from a university in China were invited to measure whether they pay attention to tactile functional information (TFI) or tactile experiential information (TEI) when purchasing 12 tactile diagnostic products using a Likert 5-point scale. Statistical results showed that blanket (N = 50, TFI = 4.04, TEI = 4.50, p = 0.021), pyjamas (N = 50, TFI = 3.82, TEI = 4.38, p = 0.010), and scarf (N = 50, TFI = 3.90, TEI = 4.42, p = 0.013) were tactile experiential products; dumbbells (N = 50, TFI = 4.28, TEI = 3.66, p = 0.007) and pinch meter (N = 50, TFI = 4.42, TEI = 3.90, p = 0.010) were tactile functional products; and gloves (N = 50, TFI = 4.26, TEI = 4.06, p = 0.274) were hybrid products.

Therefore, gloves, scarves, and pinch meter were selected as the products for secondary data collection in Study 1. Blankets were selected as the experimental products in Study 2, and pyjamas and dumbbells were selected as the experimental products in Study 3.

Formal experiment

To test the relationship between consumers' haptic cues when shopping and their purchasing behavior in online retail, this study selected gloves (tactile functional and tactile experiential mixed product), scarf (tactile experiential product), and pinch meter (tactile experiential product). Nearly 13,000 online purchase data were intercepted from the Taobao platform to inquiry whether the lack of haptic sense can be compensated by the touch between haptic cues and the product, under the premise of controlling other conditions.

Data collection

"Gloves/scarves/pinch meter" were entered into the search bar of the Taobao platform, and 4,630 gloves, 4,567 scarves, and 4,534 pinch meter were available. In order to control the influence of other variables on sales as much as possible and verify the influence of haptic cues on sales, this study chose the cover display pictures on the shopping page. The purchase page presented information such as price, product description, picture, and store name. Therefore, except for the influence of haptic cues, the price and the number of online reviews were also included in the study.

Coding

The criteria for pictures with or without haptic cues were determined. For example, for gloves, the use of models' hands to display gloves or placing cotton and other objects beside them

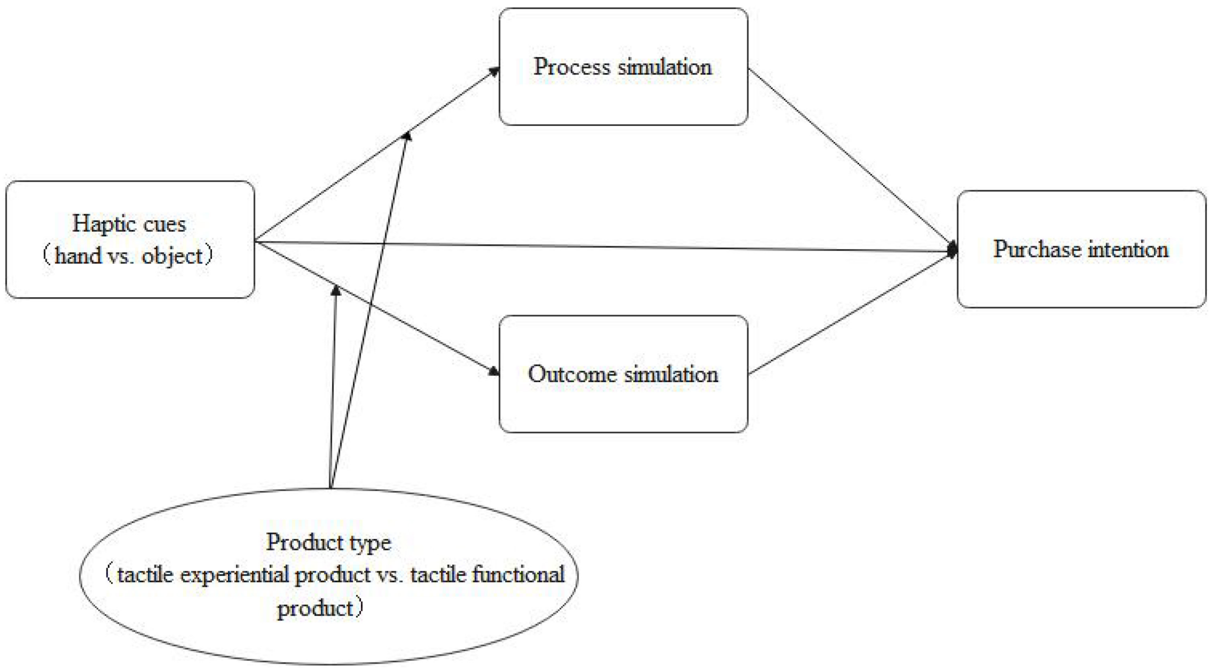

FIGURE 1
The theoretical model.

was considered as having haptic cues; otherwise, there were no haptic cues (0 = no haptic cues, 1 = have haptic cues). Scarves and pinch meter were coded in the same way.

Results

Taking the logarithm of the price in the product picture and the number of online reviews into the model to eliminate the influence of different dimensions of each variable (Huang et al., 2019; Lv et al., 2020):

$$\mathrm{Ln(Quantity)} = \mathrm{C} + \beta_1 \cdot \mathrm{Ln(Price)} + \beta_2 \cdot \mathrm{Ln(Comments)} + \beta_3 \cdot \mathrm{Cues} + \varepsilon$$

ε is the random error term, C is constant, Quantity is product sales volume, Price is product price, Comments is the online comment, and Cues is haptic cues.

Linear regression was performed on the above variables; the results of these three products will be shown in the following tables (Tables 1–3). Taking glove (hybrid product) as an example, three variables had a significant impact on sales [R^2 = 0.757, F(3,4627) = 4816.900, p < 0.001]. Specifically, the glove pictures with haptic cues had a positive correlation and significant impact on its sales [B = 0.407, t(4628) = 8.143, p < 0.001], i.e., compared with no haptic cues, the glove pictures with haptic cues had higher sales. In addition, the glove price had a negative correlation and significant impact on the sales volume [B = –0.191, t(4628) = –9.367, p < 0.001]. The higher the glove price, the lower the sales volume. The number of online reviews of gloves had a positive correlation with the sales volume [B = 0.960, t(4628) = 114.871, p < 0.001]. The more online reviews accumulated, the higher the sales volume. The same analysis was used for both the scarf and pinch meter.

TABLE 1 Results of haptic cues influence in glove presentation.

Variables	Unstandardized coefficients	Standardized coefficients	*t*	Sig.
C	1.509		16.384	0.000
Ln(Price)	−0.191	−0.070	−9.367	0.000
Ln(Comments)	0.960	0.855	114.871	0.000
Cues	0.407	0.059	8.143	0.000
R^2		0.757		
R^2 (adjusted)		0.757		
Sig. F		0.000		
F		4816.900		

Discussion

A secondary data study showed that haptic cues in product pictures had a significant impact on consumer purchasing behavior. Products were sold more when product pictures included haptic cues. Otherwise, it led to lower sales. This was partly because the haptic cues in the pictures helped consumers to simulate the products to some extent when they bought products. However, Study 1 did not distinguish and classify haptic cues, so in the following experiments, this paper further

TABLE 2 Results of haptic cues influence in scarf presentation.

Variables	Unstandardized coefficients	Standardized coefficients	t	Sig.
C	1.771		21.858	0.000
Ln(Price)	−0.105	−0.060	−6.955	0.000
Ln(Comments)	0.856	0.811	94.792	0.000
Cues	0.101	0.022	2.595	0.009
R^2		0.683		
R^2 (adjusted)		0.683		
Sig. F		0.000		
F		3283.244		

TABLE 3 Results of haptic cues influence in pinch meter presentation.

Variables	Unstandardized coefficients	Standardized coefficients	t	Sig.
C	0.641		8.354	0.000
Ln(Price)	−0.051	−0.019	−2.282	0.023
Ln(Comments)	1.030	0.796	92.766	0.000
Cues	0.522	0.105	12.276	0.000
R^2		0.689		
R^2 (adjusted)		0.689		
Sig. F		0.000		
F		3345.790		

distinguishes different types of haptic cues and verifies the influence of haptic cues on purchase intention.

Study 2: Main and mediating effect test

Pre-study

First, the design of the images in the experiment should be as consistent as possible, such as image size, color, subject, description, and other visual elements consistent with minimizing confusion about other observable factors. The only difference between these pictures differed in the type of haptic cues. Among them, the resolution of the product pictures was 825*1492, and the opacity was 100%. The only difference between pictures of each group was the haptic cue included. Three groups of experimental stimulus materials were designed to display different haptic cues, namely, hand haptic cue, object haptic cue, and non-haptic cue. Among them, the hand haptic cue was that a model's hand was touching the product. Object haptic cue was that an object with highly significant tactile attributes was touching a product to highlight tactile attributes. The display without haptic cue was a separate product display and it was designed as the control group. As shown in **Figure 2**.

Referring to the pre-test of process simulation and outcome simulation of Xie et al. (2016), subjects were determined that they were capable of process and outcome simulation of the product. Referring to the mental simulation scale developed by Xie et al. (2016), a Likert 7-point scale of "not at all" (1) and "to a great extent" (7) was used. Scale details in **Appendix Table 1**. In the experiment, subjects were asked to watch product pictures (hand haptic cue vs. object haptic cue vs. control group: no haptic cue) and reported their ability to simulate the process of using the product and the degree of simulated enjoyment after using the product (such as simulating the touch of the product, feeling its weight, and texture softness). At the same time, with reference to metaphor control, a Likert 7-point scale of "not at all important" (1) and "extremely important" (7) was used to ask subjects to report whether the product description they viewed was "straightforward and factual" or "figurative and abstract."

A total of 117 undergraduates from a university in China were randomly assigned to the above three experimental groups. An ANOVA revealed a significant effect on mental simulation [$F(2,114) = 14.175$, $p < 0.001$, $\eta^2 = 0.199$], with hand haptic cue ($M_{\text{hand}} = 5.73$, $SD = 0.77$) significantly increasing mental simulation relative to the object haptic cue ($M_{\text{object}} = 5.14$, $SD = 0.84$, $p = 0.007$) and no cue ($M_{\text{control}} = 4.58$, $SD = 1.18$, $p < 0.001$). These results indicated that the subjects could perform a greater degree of mental simulation on the hand haptic cue. There was less conceptual tension in the hand haptic cue, and subjects were suitable and capable to complete the related cognitive tasks that required the initiation of mental simulation.

An ANOVA revealed a significant effect on metaphor control [$F(2,114) = 47.343$, $p < 0.001$, $\eta^2 = 0.454$], with hand haptic cue ($M_{\text{hand}} = 4.74$, $SD = 0.93$) significantly increasing metaphor control relative to the object haptic cue ($M_{\text{object}} = 4.20$, $SD = 1.11$, $p = 0.015$) and no cue ($M_{\text{control}} = 2.74$, $SD = 0.75$, $p < 0.001$). These results indicated that subjects perceived a higher degree of metaphor in the hand haptic cue group. There was less conceptual tension in the hand haptic cue group, and the manipulation of metaphorical picture design in the experimental stimulus material was successful in this study.

Formal experiment

Experimental design and process

The purpose of Study 2 was to explore the potential and mechanism of the haptic cue in achieving tactile compensation in online product presentations. The formal experiment was designed as a single-factor experiment between subjects. The display of haptic cues included: hand haptic cue vs. object haptic cue vs. control group: no haptic cue and the experimental product was a blanket (tactile experiential product). Using G*power software, it was calculated that at a significance level of 0.05 and a moderate effect size ($f = 0.25$), the total sample size predicted to reach a statistical power level of 80% was at least 159. Thus, the planned sample size was 190. Due to epidemic and subject time conflicts, finally, 165 undergraduates from a university in China were invited and randomly divided into three groups (56, 54, and 56, respectively, including

FIGURE 2
Study 2 stimulus materials.

90 women). All subjects were aged 18–25 and had online shopping experiences.

According to the experimental design of Van Mulken et al. (2014), three experimental situations were designed, and a virtual product named "MOCI" was introduced. The product display page was forced to be exposed for 20 s to simulate the online shopping environment. Only after the retention time were subjects allowed to open the next page and fill in the subsequent test objects. Subjects were introduced to a simulated online shopping situation, where they were all asked to imagine themselves shopping online. After browsing the product display page, they were required to fill in the process simulation scale (α = 0.853), outcome simulation scale (α = 0.881) [adapted from Elder and Krishna (2012) and Xie et al. (2016)], purchase intention scale (α = 0.863), and other research scales as well as fill in relevant demographic variables. Scale details in **Appendix Table 1**.

Results

Manipulation test

ANOVA results showed there were significant differences in the degree of metaphorical expression among the three groups ([$F(2, 163) = 84.237$, $p < 0.001$, $\eta^2 = 0.508$]. There were significant differences in the degree of metaphorical control between the hand haptic cue ($M_{\text{hand}} = 4.71$, $SD = 0.75$) and object haptic cue ($M_{\text{object}} = 4.38$, $SD = 0.78$, $p = 0.023$), and with the control group ($M_{\text{control}} = 2.96$, $SD = 0.74$, $p < 0.001$). This indicated successful manipulation of haptic cues.

Main effect test

ANOVA results showed that haptic cues display had a significant effect on consumers' purchase intention [$F(2,163) = 21.476$, $p < 0.001$, $\eta^2 = 0.209$]. Participants had a higher level of purchase intention for the product with hand haptic cue ($M_{\text{hand}} = 4.98$, $SD = 0.80$) relative to the object haptic cue ($M_{\text{object}} = 4.24$, $SD = 0.85$, $p < 0.001$) and no cue ($M_{\text{control}} = 3.78$, $SD = 1.23$, $p < 0.001$). Further *post hoc* tests yielded significant differences between all three groups (all $p < 0.05$). These effects are not qualified by age ($p = 0.470$) or gender ($p = 0.673$). Thus, H1 was verified.

Mediating effect test

According to the mediating effect analysis procedure proposed by Zhao et al. (2010), Bootstrap methods proposed by Preacher et al. (2007) and Hayes (2013) were applied to examine the mediating effects. Mediation analysis model 4 was selected, and the sample size was 5,000. The sampling method was the non-parametric percentile method with selection bias correction under 95% confidence intervals. Purchase intention was the dependent variable, haptic cues were the independent variable, and process simulation and outcome simulation were the dual mediating variables. The independent variable of haptic cues was multiple categorical variables, thus, it was re-coded. Two dummy variables X1 and X2 were added with the control group as the benchmark X1 (control vs. hand) and X2 (control vs. object) were defined as independent variables. Results showed that process simulation had a mediating effect ($\beta = -0.3379$, $SE = 0.1044$, CI = [−0.5580, −0.1475]), with X1 (hand vs. control) as the independent variable, process simulation the mediating variable, and purchase intention the dependent variable. The specific results are shown in **Figure 3**.

Exclusion of other explanations

In conducting the above mediation test, it was also tested whether the process simulation and the outcome simulation could play a mediating role when the independent variable was X2 and whether the outcome simulation could play a mediating role when the independent variable was X1. When X2 (object vs. control) was the independent variable, process simulation was the mediating variable, and purchase intention was the dependent variable, process simulation had no significant mediating effect ($\beta = -0.1583$, $SE = 0.0959$, CI = [−0.3570, 0.0122]). When X2 (object vs. control) was the independent variable, outcome simulation was the mediating

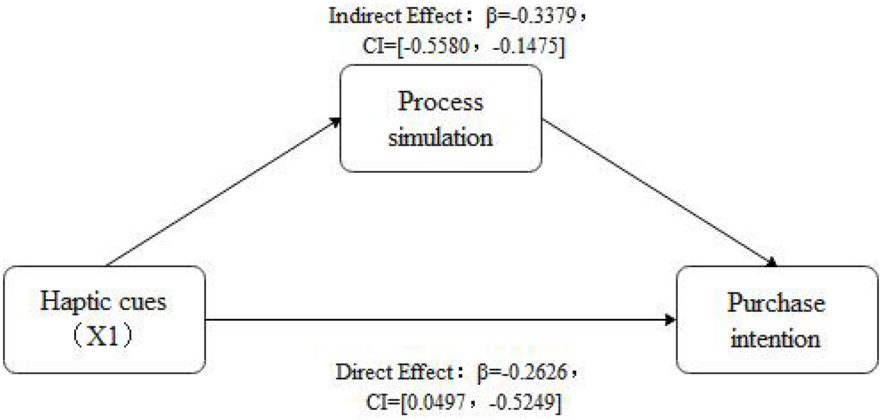

FIGURE 3
The mediating effect of process simulation.

variable, and purchase intention was the dependent variable, outcome simulation had no significant mediating effect (β = −0.2004, SE = 0.1551, CI = [−0.5229, 0.0854]). Taking X1 (hand vs. control) as the independent variable, outcome simulation as the mediating variable, and purchase intention as the dependent variable, it was found that there was no significant mediating effect of outcome simulation (β = −0.1113, SE = 0.0642, CI = [−0.2472, 0.0081]).

Discussion

The results of the study's second main effect support H1 that MVL representations of haptic cues positively influence consumers' purchase intentions. Specifically, the presentation of haptic hand cues elicited more positive purchase intentions compared to object haptic cues and no haptic cues. The new contribution of our study compared to (Lv et al., 2020; Maille et al., 2020) is that it focuses on the design of haptic cues and extends on the metaphorical structure of visual language from mental simulation theory, confirming that not only the presence of object haptic cues can play a tactile compensatory role but also hand haptic cues can be used as a haptic cue to achieve tactile compensation and enhanced purchase intention.

Mediating effect analysis of Study 2 showed that, even when the consumer was buying online and could not have direct experience of the sense of touch, haptic cues could enhance the degree of consumer mental simulation. Specifically, process simulation mediated hand haptic cue and purchase intention, and the results of outcome simulation' mediating effect had not been confirmed, leading to H2 being partly verified. This study believed that the reason for H2 partly verified may be that consumers tend to feel and enjoy the soft and warm blanket by hand but outcome simulation cannot mediate this process. Therefore, there might be a boundary mechanism leading to this result. If there is a boundary mechanism, can the conclusion in H1 that hand haptic cues can induce more positive purchase intention than object haptic cues be proved again? Therefore, on the basis of Study 2, Study 3 further expands the experimental validity, expands the offline experiment to each online group of subjects, and explores the influence of its boundary mechanism.

Study 3: Moderating effect test

Pre-study

According to the pre-experiment of product type, the coral-wool pyjama was determined as a tactile experiential product, and the dumbbell was determined as a tactile functional product.

Similar to the experimental design of Study 2, to ensure that experimental pictures of two products were consistent with other factors except for haptic cues, a single-factor inter-group design was adopted. All subjects were divided into the hand haptic cue group and an object haptic cue group. As shown in **Figure 4**. For the experimental products of coral velvet pyjamas, 90 questionnaires were distributed through the Credamo platform, and 83 valid questionnaires were randomly divided into two experimental groups. Results of ANOVA showed that the degree of metaphor control of the hand haptic cue (M_{hand} = 4.17, SD = 0.79) was significantly higher than that of the object haptic cue [M_{object} = 3.87, SD = 0.56; $F(1,81)$ = 4.426, p = 0.039]. Similarly, for dumbbell, 90 questionnaires were distributed through the Credamo platform, and 84 valid questionnaires were randomly divided into two experimental groups. Results of ANOVA showed that the degree of metaphorical perception of object haptic cue (M_{object} = 4.21, SD = 0.71) was significantly higher than that of hand haptic cue [M_{hand} = 3.86, SD = 0.63; $F(1,82)$ = 5.679, p = 0.019]. It indicated that the metaphorical control of the two groups was successfully manipulated and expressed.

Participants who completed the metaphorical control pre-experiment continued to participate in the mental simulation

FIGURE 4
Study 3 stimulus materials.

pre-experiment. For the experimental products of pyjamas, the results of ANOVA showed that the degree of mental simulation of the hand haptic cue (M_{hand} = 5.58, SD = 0.77) was significantly higher than that of the object haptic cue [M_{object} = 5.32, SD = 0.89; $F(1,81)$ = 8.496, p = 0.005]; For dumbbell, the degree of mental simulation of the object haptic cue (M_{object} = 5.42, SD = 0.66) was significantly higher than that of the hand haptic cue [M_{hand} = 4.88, SD = 1.32; $F(1,82)$ = 5.530, p = 0.021]. These results indicated that the participants had less conceptual tension between pyjamas (dumbbell) and hand haptic cue (object haptic cue) and were able to complete related cognitive tasks requiring mental simulation.

Formal experiment

Experimental design and process

Study 3 was a two-factor group design: 2 (haptic cue: hand vs. object) × 2 (product type: tactile functional product: dumbbell vs. tactile experiential product: pyjamas). The experimental process of Study 3 was similar to Study 2. A virtual brand named "MOCI" was introduced. After glancing over the product display page, participants filled in the process simulation (α = 0.897), outcome simulation (α = 0.902), purchase intention (α = 0.927) scales, and demographic variables. Using G*power software, it was calculated that at a significance level of 0.05 and a moderate effect size (f = 0.25), the total sample size predicted to reach a statistical power level of 90% was at least 171. So 220 questionnaire was distributed through the Credamo platform, and 198 valid questionnaires were recovered (101 women and 97 men, with an average age of 28 years), 92% of the subjects had more than 3 years of online shopping experience. All the subjects were randomly assigned to four experimental groups (50, 50, 50, and 48, respectively).

Results

Test of metaphorical control manipulation

In the coral wool pyjamas group, ANOVA results showed that the metaphorical perception degree of the hand haptic cue (M_{hand} = 4.09, SD = 0.72) was significantly higher than that of object haptic cue [M_{object} = 3.74, SD = 0.67; $F(1,98)$ = 6.212, p = 0.014]. In the dumbbell group, ANOVA results showed that the metaphorical perception degree of object haptic cue (M_{object} = 3.66, SD = 0.69) was significantly higher than that of hand haptic cue [M_{hand} = 3.41, SD = 0.50; $F(1,96)$ = 4.369, p = 0.039], indicating successful metaphorical manipulation of the two groups.

Main effect test

The purchase intention was used as the dependent variable to test whether there were interaction effects between haptic cues and product types. ANOVA results showed that the interaction effect between product types and haptic cues was significant (F = 26.384, p < 0.001, η^2 = 0.120), the main effect of product types was significant (F = 17.077, p < 0.001, η^2 = 0.081), and the main effect of haptic cues was also significant (F = 4.707, p = 0.031, η^2 = 0.024). A simple effect test further found that when products were tactile experiential products, the main effect of the haptic cue was significant, and the hand haptic cue (M_{hand} = 5.32, SD = 1.03) got higher purchase intention than the object haptic cue [M_{object} = 4.32, SD = 0.83; F(1,98) = 28.949, p < 0.001]. When products were tactile functional products, the main effect of the haptic cue was significant, and the haptic cue of the object (M_{object} = 4.45, SD = 1.06) caused higher purchase intention than the haptic cue of hand [M_{hand} = 4.05, SD = 0.94; F(1,96) = 4.072, p = 0.046], which is shown in **Figure 5**. These effects are not qualified by age (p = 0.087) or gender (p = 0.190).

Mediating effect test

Process simulation was used as the dependent variable to test whether there were interaction effects between haptic cues and product types. ANOVA results showed that the interaction effect between product types and haptic cues was significant (F = 3.925, p = 0.049, η^2 = 0.020), and the main effect of product type was significant (F = 23.191, p < 0.001, η^2 = 0.107), that is to say, tactile experiential products ($M_{\text{experiential}}$ = 5.17, SD = 0.95) caused more process simulation than tactile functional products [$M_{\text{functional}}$ = 4.50, SD = 1.06; F(1,196) = 21.964, p < 0.001]. The main effect of haptic cues was also significant [F = 8.175, p = 0.005, η^2 = 0.040]. Thus, the hand haptic cue (M_{hand} = 5.03, SD = 1.10) caused more process simulation than the object haptic cue [M_{object} = 4.64, SD = 1.00; F(1,196) = 7.096, p = 0.008]. In order to test the mediating effect of process simulation, this study drew upon the mediation analysis procedure proposed by Zhao et al. (2010), and the adjusted mediation analysis model 8 proposed by Preacher et al. (2007) and Hayes (2013) to conduct the Bootstrap mediation variable test. The sample size was set to 5,000, and under the 95% confidence interval, process simulation did mediate the interaction between haptic cues and product types on purchase intention. The mean value of the interaction effect size was 0.1573, and the confidence interval of the Bootstrap test was [0.0035, 0.3215], excluding 0, indicating the existence of moderated mediation effect. To be specific, when the product was the tactile experiential product, the mean value of the indirect effect size was 0.1922, and the confidence interval of the Bootstrap test was [0.0675, 0.3382], excluding 0, indicating that the indirect effect was significant. These results showed that when browsing tactile experiential products, the mediating effect of process simulation existed, as shown in **Figure 4**.

Similarly, the outcome simulation was tested again as the dependent variable. ANOVA results showed that the interaction effect between product types and haptic cues was significant (F = 4.435, p = 0.036, η^2 = 0.022), and the main effect of product types was significant (F = 5.291, p = 0.022, η^2 = 0.027).

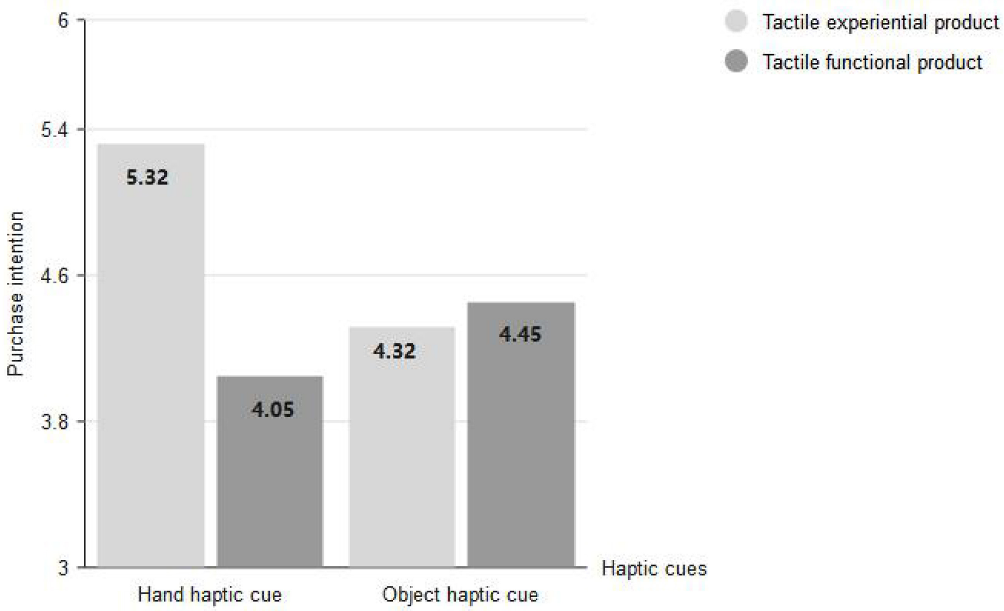

FIGURE 5
Interaction effects between haptic cues and product types.

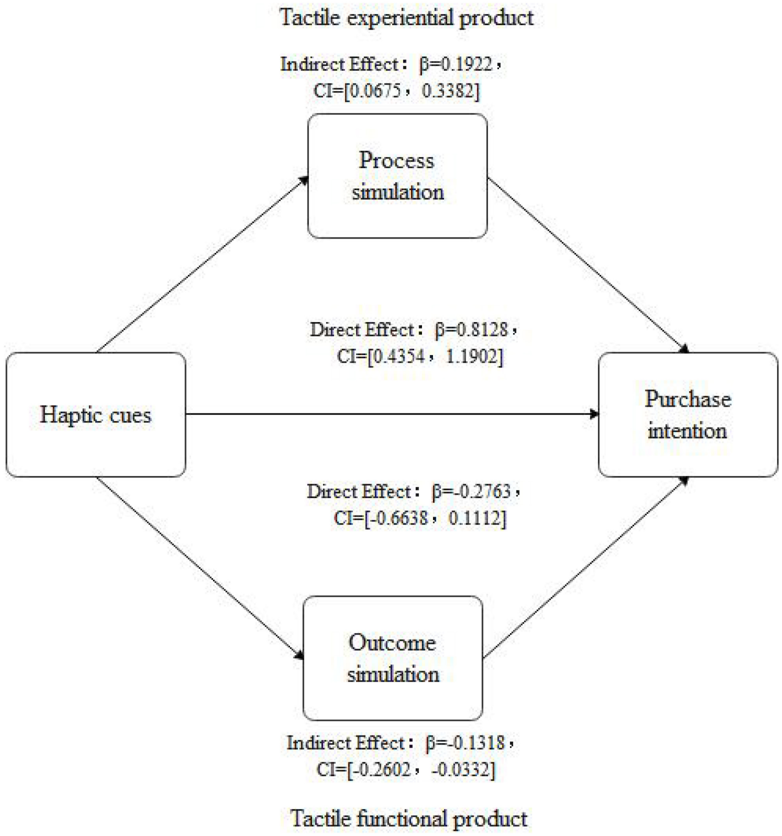

FIGURE 6
Mediating effect of process simulation (tactile experiential product) and outcome simulation (tactile functional product).

Tactile functional products ($M_{\text{functional}}$ = 5.08, SD = 1.04) caused higher outcome simulation than tactile experiential products [$M_{\text{experiential}}$ = 4.73, SD = 1.22; $F(1,196)$ = 4.880, p = 0.028]. The main effect of haptic cues was significant (F = 5.799, p = 0.017, η^2 = 0.029). Object haptic cues (M_{object} = 5.09, SD = 1.06) generated higher outcome simulation than hand haptic cues [M_{hand} = 4.72, SD = 1.19; $F(1,196)$ = 5.377, p = 0.021]. Similarly, to test the mediating effect of outcome simulation, outcome simulation did mediate the interaction between haptic cues and product types on purchase intention. The mean value of the interaction effect size was 0.1230, and the confidence interval of the Bootstrap test was [0.0053, 0.2961], excluding 0, indicating the existence of the moderated mediating effect. Specifically, when the product was the tactile functional product, the mean value of the indirect effect size was −0.1318, and the confidence intervals of the Bootstrap test were [−0.2602, −0.0332], respectively. This interval did not include 0, indicating that the indirect effect was significant. These results suggested that when browsing tactile functional products, the mediating effect of outcome simulation existed, as shown in **Figure 6**.

Ruling out other explanations

In this study, the moderated mediation test was conducted, and other conditions were also tested for the absence of mediation. For the tactile functional product, the mean indirect effect of process simulation was 0.0349, and the confidence interval of the Bootstrap test was [−0.0845, 0.1847], including 0. For the tactile experiential product, the mean value of the simulated indirect effect of outcome simulation was −0.0088, and the confidence interval of the Bootstrap test was [−0.1009, 0.8980], including 0.

Discussion

Study 3 aimed to explore the boundary mechanism of the influence of haptic cues in MVL on mental simulation and purchase intention. Results of Study 3 supported H3 and H2 and answered the applicable boundary conditions for H1 discussed in Study 2. The vicarious touch effect produced by haptic cues in MVL has the effect of boundary mechanisms, and not all types of products achieve optimal results using hand haptic cues, which is consistent with our main point. Also, this result fills the previous study, where Luangrath et al. (2022) chose clothing as the product type and did not explore the product type in depth.

Therefore, the results of our Study 3 can be used as a complement. That is, for haptic experiential products, designing hand haptic cues can achieve the best results. For haptic functional products, on the other hand, they should be designed with object haptic cues rather than hand haptic cues.

Findings and discussion

Conclusion

Based on one secondary data study and two scenario simulation experiments, this paper drew the following conclusions: First, haptic cues in MVL could promote consumers' purchase intention of tactile salient attributes products, and process simulation and outcome simulation played different mediating roles. Specifically, compared with the use of object haptic cues and non-haptic cues, the use of hand haptic cues in product display could produce a higher degree of process simulation and improve purchase intention. However, when object haptic cues were displayed, consumers would get a higher degree of outcome simulation, and then their purchase intention was improved. Second, the influence of haptic cues in MVL on consumers' purchase intention and mental simulation had a boundary mechanism, and product types played a moderating role in it. Specifically, only the display of hand haptic cues with the tactile experiential product could enhance consumers' purchase intention, and process simulation played a mediating role. For tactile functional products, only when displaying object haptic cues could outcome simulation play the role of mediation, so as to promote consumers' purchase intention.

Theoretical contributions

First, there was little literature examining the tactile compensation effect in terms of haptic cues in MVL. This paper combined the visual structure of metaphors in visual language with conceptual tension as a criterion for judging MVL to investigate consumer online tactile compensation. Based on visual language, this study proved the idea of Yim et al. (2021) and Luangrath et al. (2022) that observing another person's hand touch also promotes tactile perception as well as product attitudes at the first step. From a metaphorical rubric conceptual tension perspective, this paper complemented Gkiouzepas and Hogg's (2011) study that the conceptual tension of haptic cues had a positive impact on consumers' attitudes, thus compensating for consumers' missing tactile sensations. Thus, no matter from the point of conceptual tension or haptic cues in MVL, the suggestion of haptic cues in MVL was helpful to shorten the distance between consumers and products. It linked consumers and products from visual and tactile sensory dimensions to achieve the effect of communication between the two.

Second, consumers in the Internet context tend to obtain reliable information by observing others' experiences and sensing sensory attributes (O'Donnell and Evers, 2019). At this time, the concept of touch visualization comes into being. While studies on touch visualization were still in the stage of physiological research (Sathian, 2016), there was a lack of empirical studies in the field of marketing. This paper differs from previous studies on the physiological stages of touch visualization by applying touch visualization theory to marketing field research. It investigated the role of touch visualization from the perspective of haptic cues in MVL, showing that adding haptic cues to MVL can significantly improve consumers' tactile perception of products, thus compensating for consumers' missing tactile sensation, promoting purchase intention, and enriching the research on touch visualization in the marketing field.

Finally, this paper focused on other pre-influencing factors that could stimulate mental simulation, such as haptic cues. Different from previous studies generally showing that clear and vivid product descriptions accompany this degree of sensory stimulation and activation (Yoon et al., 2021). This physiological response enhances the construction of mental simulation and generated positive product evaluation (Yim et al., 2018), this paper indicated that haptic cues in MVL, as an antecedent factor, could help consumers construct different types of mental simulations according to different types of products. This result fits consumers' processing motives for products and could generate positive cognition and behavior. This is because different haptic cues are highly related to consumers' motivation, and metaphors can narrow the conceptual tension among consumers, products, and haptic cues, thus increasing the familiarity and association among them.

Managerial implications

First, facing a complex situation, marketers should have a comprehensive consideration of multi-factors, such as consumers' psychological cognition, product type, medium characteristics, and many other factors. They need to choose from different visual tools to optimize communication effects. This paper designed haptic cues to change the consumers' attitude toward online products with the help of visual language tools in order to compensate for the lack of tactile sensation of online consumers.

Second, this study is helpful for online retailers to pay attention to the role of consumer mental simulation on haptic salient attribute product perception, and select or adjust marketing strategies and means accordingly. Previously, when online retailers promoted products, most of them paid attention to whether the product price was reasonable. However, the important haptic attribute of the product itself was ignored by retailers, which was also one of the reasons for the high return rate of online products. It was found in this paper that consumers could produce different types of mental simulation for haptic salient attribute products, enlightening marketers that when the products sold are haptic salient attribute products, how to maximize consumers' mental simulation of the products to enable consumers to achieve a shift in channel behavior (Li et al., 2021a,b) is the right marketing idea. For example, for tactile experiential products like blankets, hand haptic cues can enhance consumers' mental simulation of the use of blankets, so consumers can perceive the softness and warmth of blankets in advance, and their favorable degree of products will be improved, so as to achieve better marketing effects.

Finally, this study also suggests that online retailers should seize the market segments of haptic salient attribute products and utilize haptic cues to improve the market acceptance of different products. In the past, when retailers carried out online sales, they often targeted large market segments and paid little attention to the market segments of haptic salient attribute products. As a result, they only grasped marketing data, but the corresponding marketing strategy and strategy principles were not clear. The results of this paper showed that different types of haptic cues should be set for products with different types of tactile salient attributes. Such as for blankets, pyjamas, and other tactile experiential products, consumers are more likely to imagine using their hands to touch the texture of products to make the evaluation. Therefore, it is more reasonable to set hand haptic cues for tactile experiential products. Similarly, for tactile functional products such as dumbbells, haptic object cues should be set to cater to haptic attributes such as weight, so as to improve shopping satisfaction.

Limitations and future direction

First, although the valuation of products tended to increase when consumers touch products offline, it tended to decrease when others touch products through pollution effects (Argo et al., 2006). However, the pollution effect would lead to the weakening, blurring, and even distortion of consumers' mental images in their minds, thus reducing the usefulness of their mental simulation (Baumgartner et al., 1992). Whether vicarious touch in an online environment also has pollution effects reducing the usefulness of mental simulations is a topic worth exploring. In addition to addressing the topic of adding haptic cues to achieve vicariously touch, Luangrath et al. (2022) showed that future studies could exaggerate the alternative touch effect of hand haptic cues (Schirmer and McGlone, 2019). In conjunction with the single object haptic cue used in this study, ould future research further exaggerate the vividness of object haptic cues as well? Could object haptic cues be designed as living rabbits to present the softness of pyjamas?

Second, the information collected by consumers could be attributed to the information presented in the stimulus (Miller, 1994), and the high load of product information description would also affect the mental simulation and, thus, affect the judgment (Chen and Lin, 2021). This paper used a haptic cue to explore their positive impact on consumers. When presented with information overload or haptic cues that were too complex to exceed the capacity of their transmission channels, this raises the possibility of target confusion (Gomes et al., 2020). Therefore, it is necessary for future research to study the load boundary of haptic cues, and further explore what type or quantity of haptic cues can play the most positive role under certain boundary conditions, while it will produce negative effects when exceeding this boundary.

Third, due to the limited sensory experience and expression skills, the experimental materials and design in this paper cannot fully meet the requirements of the expected research effect. In addition to viewing haptic cues, the generation of consumer mental simulation may also include the influence of other factors, such as touch devices used by consumers, virtual substitutes, auditory and haptic interaction, and other factors. Future research can further explore whether haptic cues and mental simulation also have positive effects based on interactive devices, or explore the influence of factors other than haptic attributes of products on consumers' haptic perception.

Fourth, this paper mainly adopted the research method of simulated experiments with certain limitations. It can be considered to further carry out real field experiments to enhance the validity of external research.

Data availability statement

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

XL contributed to the empirical work, to the analysis of the results, and to the writing of the first draft. XZ, SW, and YX supported the total work of XL. XL contributed to overall quality and supervised the part of literature organization and empirical work. All authors discussed the results and commented on the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix

APPENDIX TABLE 1 Scale.

Variables	Title items
Metaphorical control pre-test	Do you think this product display page contains two objects between the hand and the blanket, they are related (1 = strongly disagree, 7 = strongly agree)
	Do you think this product display page contains two objects between the hand and the blanket, they are similar (1 = strongly disagree, 7 = strongly agree)
	What do you think of the product's detail display page? (1 = straightforward and responsive to facts, 7 = metaphorical and abstract)
Mental simulation pre-test (Xie et al., 2016)	When you are using this blanket, to what extent can you simulate the feeling of enjoying using this blanket? (e.g., touch it, feel the texture, weight, and softness) (1 = not at all, 7 = to a great extent)
	After you have used this blanket, to what extent can you simulate the feeling of enjoying using this blanket? (e.g., touch it, feel the texture, weight, and softness) (1 = not at all, 7 = to a great extent)
Process simulation (Xie et al., 2016)	When you viewed the blanket picture, how much did you think about the process of using and enjoying the blanket? (1 = not at all, 7 = very much)
	To what extent did images of using the blanket come to mind? (1 = not at all, 7 = to a great extent)
	Please indicate to what extent you could imagine using this blanket. (1 = not at all, 7 = to a great extent)
	How easy was it to imagine using this blanket? (1 = extremely difficult, 7 = extremely easy)
	How quickly did you start to think about using this blanket? (1 = not at all quickly, 7 = very quickly)
	How much do you agree or disagree with the statement that I had no difficulty imagining using and enjoying this blanket? (1 = strongly disagree, 7 = strongly agree)
Outcome simulation (Xie et al., 2016)	When you viewed the blanket picture, how much did you think about how you would feel after using the blanket? (1 = not at all, 7 = very much)
	To what extent did images of how you would feel after using the blanket come to mind? (1 = not at all, 7 = to a great extent)
	Please indicate to what extent you could imagine how you would feel after using the blanket. (1 = not at all, 7 = to a great extent)
	How easy was it to imagine how you would feel after using the blanket? (1 = extremely difficult, 7 = extremely easy)
	How quickly did you start to think about how you would feel after using the blanket? (1 = not at all quickly, 7 = very quickly)
	How much do you agree or disagree with the statement that I had no difficulty imagining how I would feel after using the blanket. (1 = strongly disagree, 7 = strongly agree)
Purchase intention (Bearden et al., 1984; Bone and Ellen, 1992; Biocca et al., 2001; Daugherty et al., 2008)	I will buy this one product (1 = "probably," 7 = "very likely")
	I will buy this one product (1 = "no probability," 7 = "maximum probability")
	I will buy this product (1 = "very uncertain," 7 = "very certain")
	I will buy this product (1 = "very unsure," 7 = "very sure")

Using the blanket as an example.

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The value of tourism public opinion management in social governance: A study on the impact of electronic word-of-mouth perception on people's livelihood well-being

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In the process of tourism market upgrading and tourism iteration, tourism companies will face a more complex public opinion environment. Designing a socialized public opinion management method for tourism with social governance to improve people's livelihood and well-being has become the primary concern of the tourism industry. Therefore, the existing literature has extensively focused on the role and influence of public opinion word of mouth from the perspective of tourist or consumer behavior. However, moderating role of individual tourist characteristics and environmental elements has not yet been deeply explored. Therefore, integrating with the background of the social media, this study examines how electronic word-of-mouth (eWOM) is related to the well-being of people's livelihood, and explores the interaction between individual characteristics and eWOM perception in Study 1. Furthermore, in Study 2, we provided novel boundary conditions, namely environmental elements (i.e., physical, social and historical environment). We used mixed methods (i.e., quantitative and experimental designs) to reveal that tourists' perceptions of eWOM have a significant positive effect on tourists' well-being experience. The results show that tourists' eWOM perception has a significant positive impact on their well-being experience. In addition, individual characteristics and environmental elements showed significant moderating effects between eWOM and well-being of people's livelihood. This study discusses the theoretical and practical implications, exploring the value of tourism public opinion management in social governance centered on tourists' eWOM perception, which helps tourism companies to effectively prevent and resolve risks affecting social harmony and stability in the field of cultural tourism and create a safe and stable cultural tourism market environment.

KEYWORDS

social governance, tourism public opinion, electronic word-of-mouth perception, livelihood well-being, individual characteristics, environmental elements

Introduction

In recent years, with the continuous socio-economic development and the improvement of people's living standards, tourism has a promising future (Li and Katsumata, 2020; Mamirkulova et al., 2020) Tourism has increasingly become an important starting point for enhancing social civilization and national cultural soft power (Wu et al., 2021). Economically, tourism is one of the largest sources of export earnings and an important provider of job markets in many countries (Çakmak and Çenesiz, 2020). For example, in particular, some developing countries are using it as a means of economic development to carry out various economic development activities (Cannonier and Burke, 2019). The rise of social media has revolutionized the travel industry. People post their feedback on the places they visit on the Internet, while others seek such information on the Internet. This has multiplied the interest and value of electronic word-of-mouth (eWOM). Additionally, the intent to use social networking sites in future travel-related decisions was the most prominent factor (Tran et al., 2019). However, in the process of Internet development and tourist iteration, tourism enterprises are faced with a more complex public opinion environment (Bodolica et al., 2021). For tourist attractions and tourism enterprises, controlling the excessive emotionality of online public opinion is the difficulty of tourism public opinion management (Mao et al., 2021). It is precisely because negative public opinion not only squeezes the space for true opinion, but also affects the ability of tourists to discriminate, providing a breeding ground for false rumors (Williams et al., 2022), adversely affect the further development of tourism (Mkono et al., 2020). Therefore, the tourism industry needs a social approach to manage the public opinion, such as tourists' eWOM, and individual characteristics of tourists and environmental elements to redefine and adjust tourism (Higgins-Desbiolles, 2020). The tourism industry should focus on social governance, and effectively prevent and resolve various risks that affect the harmony of the cultural tourism society. For example, the governance mechanism not only creates a safe and stable cultural tourism market environment, but also enhances the people's sense of gain, happiness and security (Scheyvens et al., 2021).

The role and impact of public opinion WOM has been extensively explored in the literature from the perspective of tourist or consumer behavior. For example, Xie et al. (2020) explored the impact of public opinion climate on tourist risk perception, destination image and tourist satisfaction. Kim et al. (2020) examined tourist perceived performance of smart hotels and exploring its impact on attitude formation and word-of-mouth intentions. Stienmetz et al. (2020) has acknowledged the extent to which perceived P2P accommodation development is associated with changes in community members' well-being from economic, social, and environmental perspectives. Likewise, we believe that WOMs have a greater impact on individual perceptions than traditional marketer-generated sources of information or even third-party expert reviews. Clearly, individuals make travel decisions based on what they perceive to be the eWOM of their unbiased peers (Nam et al., 2020; Li et al., 2021b). By examining tourists' word-of-mouth clues in the public opinion and subsequent experiences, we reflect on how the tourism industry should skillfully use public opinion to attract tourists to optimize their travel decisions. However, in the actual travel process, tourists may be affected by their own and environmental elements, and may have multiple perspectives at the same time, which has scarcely been discussed in depth in the existing research. Hence, there is an urgent need to deeply explore the well-being related WOM generated by tourists' WOM perception under different individual characteristics and environmental elements. Based on the above discussion, this paper explores the impact of tourists' exposure to eWOM in the context of the social media, focusing on the differences in well-being experience under different individual characteristics and environmental elements. In order to help the tourism industry find a way to make better use of public opinion for social governance, improve the well-being experience of tourists, and thus promote social development.

In summary, first, the current study introduces eWOM perception and livelihood well-being experience as two important independent and dependent variables respectively, and then measures these two indicators in combination with the previous maturity scale. Secondly, individual characteristics such as age and gender as moderator variables with a total of 125 valid questionnaires were examined. We used SPSS software to analyze the data to explore the interaction of eWOM perception, gender, and age on the experience of people's livelihood and well-being. Finally, with environmental elements as moderator variables, the experiment was divided into three groups: physical environment, social environment and historical environment, and 347 valid questionnaires were obtained to explore the relationship between eWOM perception and people's well-being experience in different environments.

The aim of this study was to elucidate the intrinsic link between eWOM perception, hedonic well-being, and eudaimonia well-being by exploring causal relationships and regulatory mechanisms. This study also analyzes the moderating effects of tourists' individual demographics characteristics and environmental elements, confirms the existence and applicability of people's well-being experience in eWOM, and provides new theoretical insights for the applicable margin of WOM in the field of tourism, which may be conducive to further exploration by researchers to a certain extent. Finally, this study suggests that the tourism industry should continuously promote and optimize online travel service platforms, fully consider the advantages of eWOM dissemination, and combine the personal characteristics and environmental elements of tourists to optimize travelers' travel strategies and improve people's travel experience. The well-being of people's livelihood has certain practical significance for the management of tourism public opinion in social governance.

In order to effectively explore the interaction between tourists' eWOM perception and individual characteristic elements and environmental elements, this paper designs two studies for empirical analysis. Study 1 selected consumers who booked and stayed at least once in homestays on "Ctrip" as the measurement objects, analyzed the gender and age moderators between eWOM perception and people's happiness experience, and explored the influence of their interaction with eWOM perception. Individual statistical characteristics of tourists' hedonic well-being and well-being. In the Study 2, three Xi'an attractions, "Xi'an Ancient City," "Yuanjia Village" and "Zhongnan Mountain" were selected as experimental materials, to analyze the moderating mechanisms of physical environment, social environment, and historical environment in the relationship between perceptions of eWOM and livelihood well-being experience and then hedonic well-being and eudaimonic well-being.

Literature review and research hypothesis

Word-of-mouth perception and livelihood well-being experience

Under the phenomenon of information exchange, word-of-mouth is referred to oral communication between two or more persons about a product or service (Kim et al., 2020), with flexibility, vividness, persuasive, and diagnostic features (Le et al., 2019; Sanchez et al., 2020; Zhao et al., 2020). Specifically, eWOM is easier to obtain and can reach a wider audience faster (Loureiro et al., 2018; Lee and Choi, 2019; Verma and Yadav, 2021). Prior literature has extensively investigated the action mechanism of word of mouth and its electronic form (i.e., eWOM) in the field of hospitality and tourism (Huete-Alcocer, 2017; Yen and Tang, 2019; Pourfakhimi et al., 2020; Zhang et al., 2022), arguing that the perception of word-of-mouth can predict tourists' behavior (Lee et al., 2022). Therefore, prior scholars have recognized it as an indispensable driving force in the development of tourism (Han et al., 2019).

Previous literature review suggests that tourists' motivation to use eWOM can be segregated into two aspects. First, it is to build a bridge for effective communication through eWOM, connecting tourists with local residents, service personnel, and the environment (Chen et al., 2018; Jia, 2020; Khalid et al., 2021a). This shapes people's emotional beliefs when making travel choices so that tourists experience satisfaction in the travel process (Kim et al., 2019). Second, it is the cognitive motivation, said to be an information-intensive network environment. In such an environment, eWOM simplifies formulating a set of decision criteria, reduces uncertainty and risk (Naujoks and Benkenstein, 2020), and promotes the formation of preferences and the differentiation of various alternatives (Hu and Yang, 2020). Moreover, this shapes the cognitive structure and helps consumers increase their decision accuracy, satisfying consumers' curiosity or information needs (Khalid et al., 2021b; Mainolfi et al., 2022).

In addition to customers satisfaction, well-being is an imperative construct that is referred to as the consumer's perception of the extent to which a brand (a consumer good or service) contributes positively to various life domains and creates an overall perception of the quality of life, being affected by brands (Hwang and Lee, 2019; Kang, 2020). An Individual's Well-being experience is segregated into two dimensions: hedonic and eudaimonic well-being (Vada et al., 2019). Hedonic well-being includes positive emotions, happiness, and joy, while eudaimonic well-being focuses on personal growth and self-improvement (Rahmani et al., 2018). Furthermore, hedonic well-being corresponds to effective motivation, as explained above. Likewise, eudaimonic well-being corresponds to cognitive motivation. Hence, customers' perceived usefulness and enjoyment when they visit a website result in increasing the quality of life in such associated life domains (Kim et al., 2019). Specifically, in the context of online experience, prior findings have linked the value created by customers' product/service experience with their well-being (Hwang and Lee, 2019; Davlembayeva et al., 2020; Yi et al., 2022). For example, when tourists visit a travel website, they perceive informal interpersonal communication between non-commercial communicators and recipients about brands, products, organizations, or services (Reyes-Menendez et al., 2019), believing that the travel website meets their needs in social and travel life (Choi et al., 2019). That can improve the perceived well-being of various areas of their travel experience and thus enhance their well-being experience (Joseph Sirgy, 2019).

Therefore, this study holds that hedonic well-being and eudaimonic well-being can be enhanced when visitors satisfy their affective and cognitive motivations through perceived positive eWOM. Based on this, this paper proposes the following hypothesis:

> *H1*: eWOM perception can significantly and positively influence livelihood well-being experience.

Moderating effect of individual statistical characteristics elements

Current study on the impact of word of mouth on satisfaction highlights personal characteristics, such as gender (Akinci and Aksoy, 2019; Sun et al., 2019; Craciun et al., 2020) and age (Shaikh et al., 2018; Blanchflower, 2021; Donthu et al., 2021; Zhang et al., 2021), that intend to influence customer behavior. Gender, among other personal characteristics, is a significant reason for individual differences. Prior literature shows that the behavioral differences between men and women are mainly manifested in the following three aspects: first, there are personality differences between men and women (South et al., 2018; Luqman et al., 2022). Such that women are delicate, impulsive, emotional, and easily influenced by others (Li et al., 2019), while men are relatively rational and tend to be more purposeful than women (Ye et al., 2018). Second, men and women communicate socially for different reasons (Long and Tefertiller, 2020). In general, female communication tends to be emotional (Li et al., 2019), preferring to achieve self-emotional enhancement and reciprocity by sharing information with others (Dhir et al., 2016). In contrast, males tend to communicate to exchange information, with a motivation to gain others' approval (Huber and Malhotra, 2017; Luqman and Zhang, 2022). Third, the level of perceived risk differs between males and females. Moreover, both genders have different attitudes toward cyber technologies (Cai et al., 2017), such that men are more familiar with cyber technologies and perceive less risk as compared to women (Lin X. et al., 2019; Masood et al., 2022).

Furthermore, age is also considered an important predictor of consumer behavior (Li et al., 2021a,b; Wang et al., 2022; Zhou et al., 2023). An individual's life stages bring variation in their social interaction (i.e., interactions with other individuals, roles, etc.) that is closely related to psychological and physical aging (Josef et al., 2016; Kotter-Grühn et al., 2016; Bodhi et al., 2022). Psychological aging refers to the changes in cognition, personality, and self (Chételat et al., 2018), while physical aging reflects a person's health status and performance (Michel and Sadana, 2017). Thus, the changes in cognitive abilities, emotional states, physical actions, and age affects consumers' word-of-mouth perception of a product or service. Consequently, this aids in forming a specific behavior or experience regarding loyalty and well-being (Kim et al., 2019; Luqman et al., 2021; Cuesta-Valino et al., 2022). According to these studies, we believe that in the context of this research, the gender and age of tourists will affect the relationship between their eWOM perception and people's well-being experience. Hence, we propose the following hypotheses:

> *H2a*: Tourist gender moderates the positive relationship between eWOM perception and livelihood well-being experience, such that relationship is strengthened when tourist gender is male vs. female?
>
> *H2b*: Tourist age moderates the positive relationship between eWOM perception and livelihood well-being experience, such that relationship is strengthened when tourist age is low vs. higher?

Moderating effect of environmental elements

The twin forces of digitalization and globalization have made people's social and work lives increasingly virtual. This virtual life has left many consumers to feel like those trees that have weak roots and are in danger of being uprooted from the earth (Park, 2019). In response, consumers attempt to (re) connect to places (Ketter and Avraham, 2021), people (van Esch and Mente, 2018), and the past (Hartmann and Brunk, 2019) in order to gain anchor. This is a sense of groundedness (Eichinger et al., 2022) refers to the result of being embedded in physical, social, and historical contexts (Walters et al., 2020). This is concerned with connections between people and places, individual and group identities, and past and present (Cogburn, 2019). First, the sense of groundedness is flourished by connecting with the natural environment or place (Jennings and Bamkole, 2019). This connection can be a literal physical connection, for example, interacting with actual, tangible objects in the local environment or being immersed in the natural environment (Cai et al., 2020; Saleem et al., 2021). In addition to physical connections, tourists can also connect with more symbolic places, for example, by consuming local products or services during the course of a trip, thus creating a connection with the destination (Li and Katsumata, 2020; Wondirad et al., 2021). Second, the sense of groundedness can be formed by connecting to the social environment (Borghi et al., 2019). This connection can be achieved not only through the community creating a familiar atmosphere of family (Wu et al., 2018). However, it is also shaped by visitors who communicate with locals (Lin P. M. et al., 2019), emphasizing a sense of belonging to an identity (Hung et al., 2019). Finally, the visitors' connection with the past, i.e., the historical environment, can shape the groundedness (Su et al., 2020; Shahbaz et al., 2021). Tourism destinations can create nostalgic brands through historical stories' narratives and cultural resource development, providing tourists with the basis of memory, tradition, and cultural values (O'Connor, 2022). Tourists are also inspired to dwell on the past, make the historic scenes live again, and help tourists understand the roots of tourist destinations (Mun et al., 2018). Thus, a sense of groundedness can serve as a foundation for social and individual well-being based on people's connection to their physical, social, and historical environments, giving people strength, security, and stability (Yang et al., 2020).

Drawing from prior findings, we argue that eWOM, as an external environmental stimulus, allows people to establish an emotional connection with their physical, social, and historical environment, providing a sense of balance, belongingness, and thus enhancing their experience of well-being. Hence, we propose the following hypotheses:

> *H3a*: The physical environment significantly moderates the positive relationship between eWOM perception and livelihood well-being experience.
>
> *H3b*: The social environment significantly moderates the positive relationship between eWOM perception and livelihood well-being experience.
>
> *H3c*: The historical environment significantly moderates the positive relationship between eWOM perception and livelihood well-being experience.

Combining hypotheses H1, H2a, H2b, H3a, H3b and H3c, the corresponding theoretical model is plotted, as shown in Figure 1. The upper part of the model diagram is the content of Sub-study 1, that is, to verify the correlation between eWOM perception and

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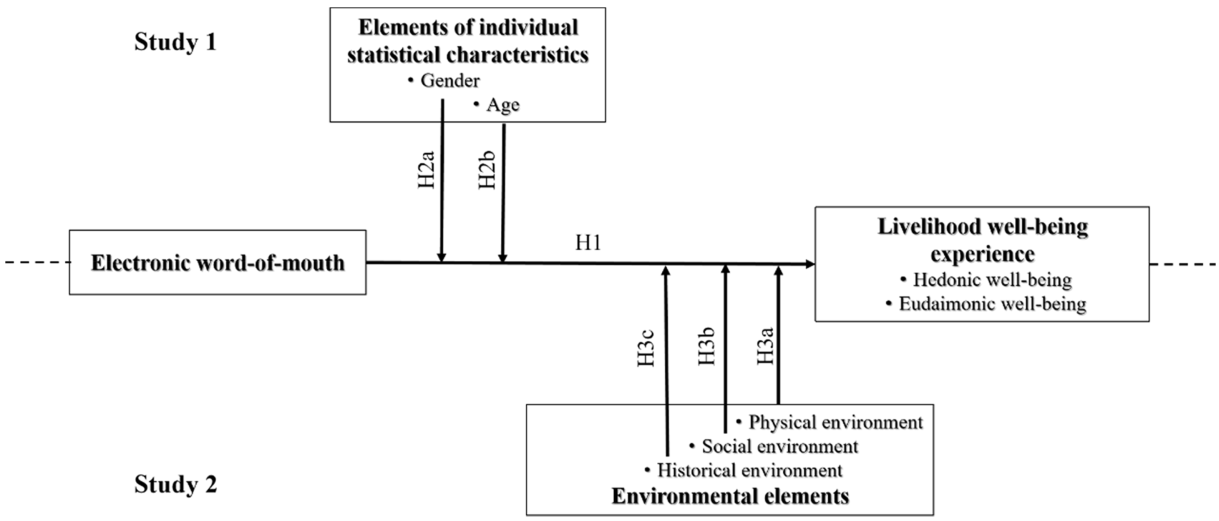

FIGURE 1
Theoretical model diagram.

people's well-being experience, and the moderating role of different individual characteristics (i.e., gender and age) in it. The lower part of the model diagram is the content of Sub-study 2, that is, to re-verify the correlation between eWOM perception and people's livelihood and well-being experience, and explore the moderating role of different environmental elements (i.e., physical environment, social environment and historical environment) in it.

Research design

To explore the value of tourism public opinion management in social governance, this study investigates its effects on livelihood well-being experience (i.e., hedonic well-being and eudaimonic well-being) from the perspective of tourists' eWOM perception in the context of internet era. The tourist's eWOM perception, directly affecting peoples' livelihood well-being, may also be influenced by personal statistical characteristics and environmental elements. Therefore, this study introduces personal statistical characteristics and environmental elements as moderating variables. These moderating variables help better explain the relationship between eWOM and people's livelihood well-being experience. This study considered personal statistical characteristics in terms of gender, i.e., male and female, and age measured in three groups, i.e., youth (18–40 years), middle age (41–64 years), and old age (≥65 years). In addition, we considered environmental elements in terms of the physical, social, and historical environment. We adapted the measurement items from the maturity scale with slight amendments according to this study's context. These measurement items encompass five questions on eWOM perception (Set them to KB1-KB5) from Jalilvand and Samiei's (2012) eWOM scale and eight questions on livelihood well-being experience from Vada et al.'s (2019) well-being scale. The livelihood well-being experience consists of five questions on hedonic well-being (Set them to XL1–XL5) and three questions on eudaimonic well-being (Set them to SX1–SX3).

Two studies are designed in the current paper considering the above measurements. Whereby, study 1 analyzes the moderating mechanisms of personal characteristics (i.e., gender and age) between eWOM perceptions and livelihood well-being experience, and investigates the interaction affect between eWOM perceptions and individual statistical characteristics of tourists on hedonic well-being and eudaimonic well-being. Study 2 analyzes the moderating mechanisms of the physical environment, social environment, and historical environment in the relationship between eWOM perceptions and livelihood well-being experience and explores the interaction effect between eWOM perceptions and environmental elements on hedonic well-being and eudaimonic well-being, respectively.

Sub-study 1: Moderating mechanisms of the elements of individual statistical characteristics

At present, many travelers prefer to book B&B (Bed and Breakfast) services for the short term to better interact with locals and experience their lifestyles. Several other platforms like this provide relatively easy and safe conditions for such interactions. Among all such platforms, Ctrip is renowned for providing a mapping mechanism to match the services for hosts and customers. Furthermore, Ctrip is the world's leading travel service contact center, which provides quality travel options and guarantees standardization and service quality. Therefore, we considered "Ctrip" as the material for this study to measure the subjects. First, those consumers who booked on "Ctrip" and checked in at least once were selected as measurement objects. Next, we collected the demographic information of those consumers. Many prior studies have shown the significant impact of gender and age on consumer behavior and are important criteria for consumer classification to be analyzed (Pícha and Navrátil, 2019; Moon, 2021; Nusrat et al., 2021; Zhang et al., 2021). Thus, these are considered as moderating variables. Finally, we use SPSS to analyze the related data to test the moderating effect of individual characteristics on eWOM perception and people's well-being experience (hedonic happiness and eudaimonic happiness) when using "Ctrip." After calculating the average value of eWOM perception scores, the data can be divided into two categories, i.e., 0 = low eWOM perception (≤3), and 1 = high eWOM perception (>3), for further processing. Moreover, the items of the samples' hedonic happiness and eudaimonic happiness are scored on a scale of 1–5. The final calculated averages represent hedonic happiness and eudaimonic happiness. After excluding invalid questionnaires, this study considered 125 valid samples, including 66 males (52.8%) and 59 females (47.2%). The basic statistics of each variable are presented in Table 1. We used SPSS multivariate ANOVA to test the moderating mechanism of gender and age, as shown in the analysis in sections Moderating mechanisms of gender and Moderating mechanisms of age, Moderating mechanisms of the social environment, and Moderating mechanisms of the historical environment.

Moderating mechanisms of gender

Results

This study found a significant impact of eWOM perception (low and high) on hedonic well-being ($M_{low} = 1.539$, SD = 0.376; $M_{high} = 4.447$, SD = 0.495, $p < 0.001$). While the main effect of tourist gender identity (male and female) on hedonic well-being was also significant ($M_{male} = 2.767$, SD = 1.427; $M_{female} = 3.122$, SD = 1.614, $p < 0.001$). The study results showed the significant interaction of eWOM perception and tourist gender identity on hedonic well-being ($F = 11.321$, $p = 0.001$). Meanwhile, the main effect of eWOM perception (low and high) on eudaimonic well-being was also significant ($M_{low} = 1.369$, SD = 0.334; $M_{high} = 4.311$, SD = 0.531, $p < 0.001$). We further found that tourist gender identity (male and female) significantly influences the eudaimonic well-being ($M_{male} = 2.970$, SD = 1.698; $M_{female} = 2.571$, SD = 1.322, $p < 0.001$) with the significant interaction of eWOM perception and tourist gender identity on eudaimonic well-being ($F = 35.491$, $p < 0.001$).

Simple effects analysis (as in Figure 2) revealed that in the case of males, the hedonic well-being developed by high eWOM perception ($M_{high} = 4.156$, SD = 0.500) was significantly higher than that of low eWOM perception ($M_{low} = 1.459$, SD = 0.377, $p < 0.05$). Similarly, in the case of females, the hedonic well-being developed by high eWOM perception ($M_{high} = 4.779$, SD = 0.183) was also significantly higher than that of low eWOM perceptions ($M_{low} = 1.626$, SD = 0.361, $p < 0.05$). At the same time, for males, the eudaimonic well-being developed by high eWOM perceptions ($M_{high} = 4.667$, SD = 0.369) was significantly higher than that of low eWOM perceptions ($M_{low} = 1.373$, SD = 0.365, $p < 0.05$). Furthermore, the eudaimonic well-being developed by high eWOM perceptions ($M_{high} = 3.905$, SD = 0.372) was significantly higher than that of low eWOM perceptions ($M_{low} = 1.366$, SD = 0.303, $p < 0.05$). Hence, we can observe the interaction between eWOM perceptions and tourist gender identity on hedonic and eudaimonic well-being is significant.

TABLE 1 Study 1: Descriptive statistical analysis of each variable.

	Mean	Median	Min	Max	S.D.	Kurtosis	Skewness
KB1	2.92	3	1	5	1.707	−1.714	0.097
KB2	3.02	3	1	5	1.626	−1.629	−0.072
KB3	2.94	3	1	5	1.664	−1.692	0.039
KB4	3.02	3	1	5	1.675	−1.682	0.006
KB5	2.94	3	1	5	1.677	−1.690	0.017
XL1	3.00	3	1	5	1.704	−1.688	0.010
XL2	2.99	3	1	5	1.521	−1.482	0.042
XL3	2.80	3	1	5	1.476	−1.375	0.184
XL4	2.98	3	1	5	1.677	−1.712	0.049
XL5	2.90	2	1	5	1.701	−1.738	0.092
SX1	2.78	3	1	5	1.616	−1.604	0.138
SX2	2.81	2	1	5	1.610	−1.608	0.177
SX3	2.76	2	1	5	1.603	−1.593	0.209

Discussion

Initially, this section found a significant positive effect of eWOM perception on livelihood well-being experience (hedonic well-being and eudaimonic well-being), which verified hypothesis H1. In addition, we discovered the significant differences in the interaction effect between eWOM perception and tourist gender identity on hedonic well-being and eudaimonic well-being. For female tourists, hedonic well-being was higher for high eWOM perception (vs. low eWOM perception). On the other hand, eudaimonic well-being was higher for male-identified tourists. Hence, these results verified hypothesis H2a.

However, for moderating effect of age, the following research explains the effect of the interaction between eWOM perception and the age group of the tourists on hedonic and eudaimonic well-being.

Moderating mechanisms of age

Results

This study investigated the moderation effect of age and found a significant impact of tourists' age group (youth, middle age, and old age) on hedonic well-being ($M_{youth} = 3.956$, SD = 0.732; M_{middle}

$_{age} = 1.672$, $SD = 0.703$; $M_{old\ age} = 4.500$, $SD = 0.933$, $p = 0.005$). Furthermore, the interaction effect between eWOM perception and tourists' age group on hedonic well-being was also significant ($F = 5.165$, $p = 0.007$). This study results also found the main significant effect of tourists' age group (youth, middle age, and old age) on eudaimonic well-being ($M_{youth} = 4.593$, $SD = 0.869$; $M_{middle\ age} = 1.490$, $SD = 0.732$; $M_{old\ age} = 3.775$, $SD = 0.590$, $p < 0.001$). The interaction effect between eWOM perception and tourists' age group on eudaimonic well-being was also significant ($F = 12.425$, $p < 0.001$).

The study results (as in Figure 3) revealed that for young people, the hedonic well-being formed by the high eWOM perception ($M_{high} = 4.120$, $SD = 0.424$) was significantly higher than that of the low eWOM perception ($M_{low} = 1.900$, $SD = 0.707$, $p < 0.05$). While for middle aged, hedonic well-being developed by high eWOM perception ($M_{high} = 3.900$, $SD = 0.757$) was significantly higher than that of low eWOM perceptions ($M_{low} = 1.523$, $SD = 0.374$, $p < 0.05$). The results further showed for elderly people, hedonic well-being developed by high eWOM perceptions ($M_{high} = 4.781$, $SD = 0.189$) was significantly higher than that of low eWOM perceptions ($M_{low} = 1.600$, SD $= 0.000$, $p < 0.05$). Furthermore, in case of eudaimonic well-being, young people showed significant eudaimonic well-being formed by high eWOM perception ($M_{high} = 4.827$, $SD = 0.218$) than that of low eWOM perception ($M_{low} = 1.667$, $SD = 0.000$, $p < 0.05$). While for middle aged, the eudaimonic well-being formed by high eWOM perception ($M_{high} = 4.000$, $SD = 0.770$) was significantly higher than that of low eWOM perceptions ($M_{low} = 1.322$, $SD = 0.294$, $p < 0.05$).

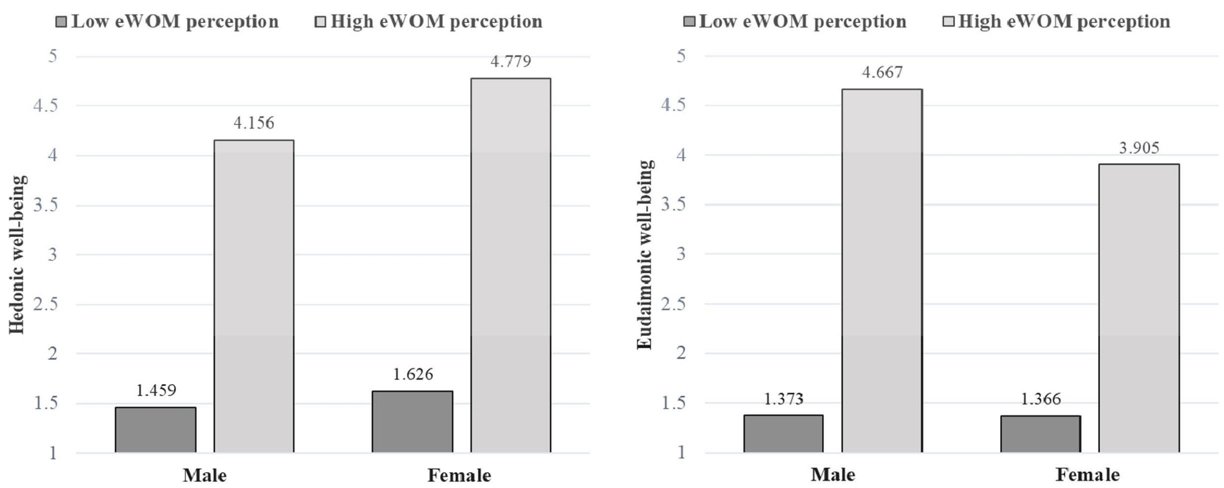

FIGURE 2
Interaction between eWOM perception and gender identity.

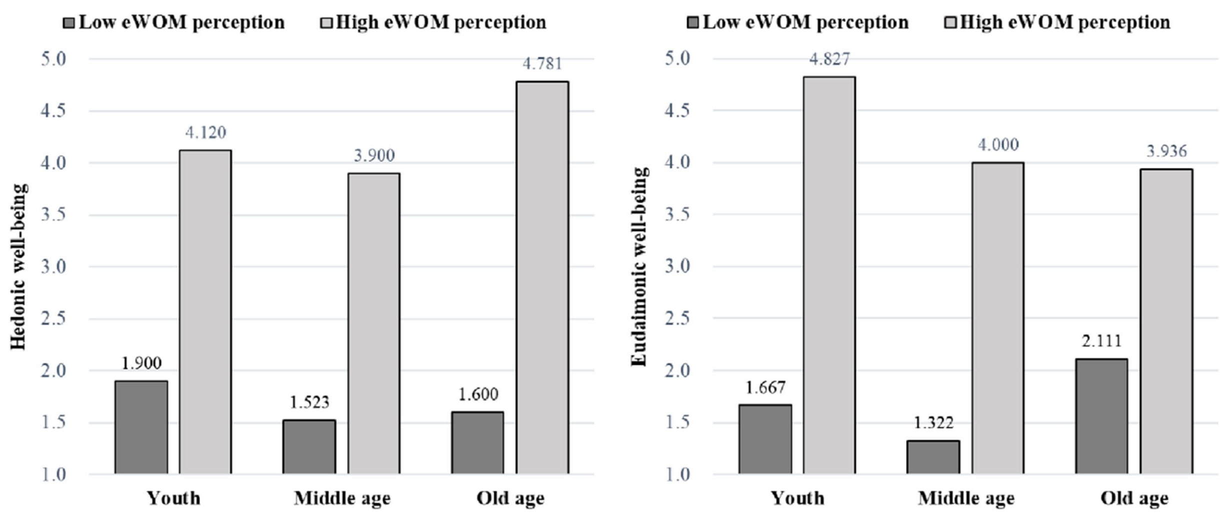

FIGURE 3
Interaction between eWOM perception and age group.

Similarly, for elderly people, the eudaimonic well-being developed by high eWOM perceptions ($M_{high} = 3.936$, SD = 0.278) was significantly higher than that of low eWOM perceptions ($M_{low} = 2.111$, SD = 0.192, $p < 0.05$). Thus, this study observed the interaction between eWOM perception and the age of tourists on hedonic well-being and eudaimonic well-being is significant.

Discussion

This section found a significant positive effect of eWOM perception on livelihood well-being experience (hedonic well-being and eudaimonic well-being), which verified hypothesis H1. In addition, we discovered a significant difference in the interaction effect between eWOM perception and the tourists' age group on hedonic and eudaimonic well-being. In the high eWOM perception, elderly tourists have the highest hedonic happiness, followed by young tourists. While middle-aged tourists experience the lowest hedonic happiness. For young people in high eWOM perception, they experience the highest eudaimonic happiness, followed by middle-aged tourists. While older tourists have the lowest eudaimonic happiness. Hence, these results verified hypothesis H2b.

However, the relationship between eWOM perception and well-being experience can be also influenced by different environments. The impact of the interaction of eWOM perception and environmental elements on the experience of livelihood well-being has been explored in the study 2.

Sub-study 2: Moderating mechanisms of environmental elements

With today's tremendous tourism development, Xi'an has become a popular city and well-known over the internet due to its rich tourism resources and internet publicity. While Xi'an has made every effort to ensure the level of tourism services. This city has also created a wonderful cultural and tourism feast for tourists from all over the country. That includes an immersive cultural experiences, folklore and cultural activities, camping and other cultural and tourism activities for the people. To further fit the context of the physical, social, and historical environment, three Xi'an attractions, namely "Xi'an Old Town," "Yuanjia Village," and "Mount Zhongnan," were selected as the study material. The subjects were divided into three groups for measurement.

The experiment in study 2 let the subjects imagine that they had seen the relevant online reviews on "Ctrip," accompanied by corresponding pictures. The first group was the physical environment test group (as shown in Figure 4). The comment was "on the wall of the ancient city, looking at the Bell and Drum Tower, the Big Wild Goose Pagoda and the Small Wild Goose Pagoda from afar, and overlooking the streets and alleys of the ancient city, tasting the changes of the ancient city." In this comment, the words "from afar" and "overlooking" were used to reflect the sense of physical space. Next, the second group in the study was the social environment test group (as shown in Figure 5). The comment was "going to Yuanjia Village to communicate with the locals, tasting the food and experiencing the rural culture." In this comment the words such as "communicate" and "tasting" were used to reflect a kind of interpersonal atmosphere. Lastly, the third group was the historical environment test group (as shown in Figure 6). The comment was "going to Mount Zhongnan to pursue traditional cultures such as 'Taoist Culture', 'Filial Piety Culture', 'Longevity Culture', and 'God of Wealth Culture', which are most admired by the people, and appreciating the thousands of years of literati and writers who have left a large number of Cultural relics, precious calligraphy, etc." in this comment the words such as "traditional cultures," "thousands of years" and "relics" were used to reflect a kind of memory perception of history. Moving on, the subjects were asked to fill in three items on the perception of environmental elements (Set the items of the physical environment to WL1-WL3, the items of the social environment to SH1-SH3, and the items of historical environment to LS1-LS3). Then, after eliminating the invalid responses, we obtained 347 valid samples were obtained, and the three experimental groups were set to 115, 119, and 113 people, respectively. Finally, we used SmartPLS software to test the relationship between the participants' perception of eWOM and the interaction of environmental elements and the people's well-being experience (hedonic well-being and eudaimonic well-being). The moderating mechanisms of physical context, social context perception, and historical context analysis were then tested using PLS-SEM, as shown in the analyses in sections Moderating mechanisms of the physical environment, Moderating mechanisms of the social environment, and Moderating mechanisms of the historical environment.

Moderating mechanisms of the physical environment

Results

To explore the moderating mechanism of the physical environment, we first performed a descriptive statistical analysis of all variables, as shown in Table 2. It suggests that the mean value corresponding to each variable is about 3, and the standard deviation is within 3, indicating that there are no outliers in each variable, which can be preliminarily judged to be normal distribution. Second, the standardized results were used for the analysis (shown in Table 3). As for eWOM perception, its Cronbach's Alpha is 0.983, composite reliability (CR) is 0.986, and average extracted variance (AVE) is 0.936; as for hedonic well-being, its Cronbach's Alpha is 0.970, composite reliability (CR) is 0.977, and average extracted variance (AVE) is 0.895; as for eudaimonic well-being, its Cronbach's Alpha is 0.924, composite reliability (CR) is 0.952, and average extracted variance (AVE) is 0.869; as for physical environment, its Cronbach's Alpha is 0.914, composite reliability (CR) is 0.946, and average extracted variance (AVE) is 0.854. Following the existing studies (e.g., Gong et al., 2020; Luqman et al., 2020a,b), We found that Cronbach's Alpha coefficients of eWOM perception, hedonic well-being, eudaimonic well-being and physical environment were all greater

FIGURE 4
Xi'an old town (physical environment).

FIGURE 5
Yuanjia village (social environment).

than 0.8. Moreover, the composite reliability (CR) was greater than 0.8, and the average extracted variation (AVE) was greater than 0.5. These results indicated that each variable has a good convergent validity. Finally, we used bootstrapping method to calculate each path coefficient and the corresponding T-statistic and value of p (as shown in Table 4). We found that eWOM

FIGURE 6
Mount Zhongnan (historical environment).

TABLE 2 Study 2: Descriptive statistical analysis of each variable (physical environment).

	Mean	Median	Min	Max	S.D.	Kurtosis	Skewness
KB1	3.365	4	1	5	1.41	−0.98	−0.729
KB2	3.278	4	1	5	1.552	−1.278	−0.659
KB3	3.4	4	1	5	1.437	−1.008	−0.713
KB4	3.522	4	1	5	1.716	−1.346	−0.691
KB5	3.73	5	1	5	1.716	−1.202	−0.818
WL1	3.409	4	1	5	1.636	−1.449	−0.427
WL2	3.235	3	1	5	1.545	−1.383	−0.243
WL3	2.87	3	1	5	1.289	−0.871	−0.049
XL1	3.357	4	1	5	1.611	−1.307	−0.648
XL2	3.652	4	1	5	1.549	−1.084	−0.751
XL3	3.53	4	1	5	1.721	−1.347	−0.695
XL4	2.843	3	1	5	1.412	−1.117	0
XL5	2.878	3	1	5	1.452	−1.168	0.025
SX1	3.113	3	1	5	1.443	−1.215	−0.13
SX2	3.539	4	1	5	1.68	−1.41	−0.57
SX3	3.4	4	1	5	1.525	−1.147	−0.686

TABLE 3 Study 2: The facet reliability and validity of each variable (physical environment).

	Cronbach's alpha	rho_A	CR	AVE
eWOM perception	0.983	0.983	0.986	0.936
Hedonic well-being	0.97	0.971	0.977	0.895
Eudaimonic well-being	0.924	0.926	0.952	0.869
Physical environment	0.914	0.915	0.946	0.854

perception had a significant positive effect on both hedonic and eudaimonic well-being ($\beta_{\text{hedonic}} = 0.514$, $p < 0.001$; $\beta_{\text{eudaimonic}} = 0.644$, $p < 0.001$). Furthermore, the eWOM perception and physical environment interaction on hedonic and eudaimonic well-being was also found significant ($T_{\text{hedonic}} = 3.892$, $p < 0.001$; $T_{\text{eudaimonic}} = 2.244$, $p = 0.025$).

Discussion

This section found a significant positive effect of eWOM perception on hedonic well-being and eudaimonic well-being. Thus, hypothesis H1 was verified. And we also preliminarily concluded the significant moderating effect of physical environment in the relationship between eWOM perception and hedonic and eudaimonic well-being. The study findings indicated that tourists with a high level of physical environment would have more positive effects on their livelihood well-being experience with high eWOM perception, as compared to low level of the physical environment. Therefore, hypothesis H3a was verified.

TABLE 4 Study 2: Path Coefficients under moderating effect (physical environment).

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistic (|O/STDEV|)	*p*-value
eWOM perception → Hedonic well-being	0.514	0.511	0.028	18.573	0.000
eWOM perception → Eudaimonic well-being	0.644	0.648	0.050	12.831	0.000
Moderating effect 1 → Hedonic well-being	0.075	0.073	0.019	3.892	0.000
Moderating effect 2 → Eudaimonic well-being	0.090	0.091	0.040	2.244	0.025

However, we explored the moderating effect of social environment between eWOM perception and hedonic and eudaimonic well-being in the next study.

Moderating mechanisms of the social environment

Results

We first performed a descriptive statistical analysis considering all the study variable (shown in Table 5), which suggested that the mean value corresponding to each variable was about 3, and the standard deviation was within 3, indicating that there were no outliers in each variable. Second, using standardized results for analysis (shown in Table 6), we obtained Cronbach's alpha coefficients greater than 0.8 for eWOM perception, hedonic well-being, eudaimonic well-being, and social environment. Next, we found the reliability (CR) results greater than 0.8, and the average extracted variance (AVE) was greater than 0.5. As for eWOM perception, its Cronbach's Alpha is 0.981, composite reliability (CR) is 0.985, and average extracted variance (AVE) is 0.930; as for hedonic well-being, its Cronbach's Alpha is 0.967, composite reliability (CR) is 0.975, and average extracted variance (AVE) is 0.885; as for eudaimonic well-being, its Cronbach's Alpha is 0.922, composite reliability (CR) is 0.951, and average extracted variance (AVE) is 0.865; as for social environment, its Cronbach's Alpha is 0.907, composite reliability (CR) is 0.942, and average extracted variance (AVE) is 0.844. These results indicated a good convergent validity for each variable. Finally, we used Bootstrapping method to calculate each path coefficient and the corresponding T-statistic and value of p (as shown in Table 7). We found that eWOM perception had a significant positive effect on both hedonic and eudaimonic well-being ($\beta_{\text{hedonic}} = 0.516$, $p < 0.001$; $\beta_{\text{eudaimonic}} = 0.674$, $p < 0.001$). Moreover, the eWOM perception and social environment interaction on hedonic and eudaimonic well-being were also significant ($T_{\text{hedonic}} = 3.295$, $p = 0.001$; $T_{\text{eudaimonic}} = 2.762$, $p = 0.006$).

Discussion

This section found a significant positive effect of eWOM perception on hedonic well-being and eudaimonic well-being. Thus, hypothesis H1 was verified. And we also concluded the significant moderating effect of social environment between eWOM perception and hedonic well-being and eudaimonic well-being. This study observed that high eWOM perceptions have more positive effects on tourists' livelihood well-being experience in a high-level social environment compared to a low-level social environment. Therefore, hypothesis H3b was verified.

However, since the environmental element of this study also includes the historical environment, thus, the following research will focus on the moderating effect of the historical environment between eWOM perception and hedonic and eudaimonic well-being.

TABLE 5 Study 2: Descriptive statistical analysis of each variable (social environment).

	Mean	Median	Min	Max	S.D.	Kurtosis	Skewness
KB1	3.454	4	1	5	1.407	−0.792	−0.831
KB2	3.387	4	1	5	1.529	−1.064	−0.775
KB3	3.487	4	1	5	1.431	−0.821	−0.819
KB4	3.605	4	1	5	1.666	−1.125	−0.81
KB5	3.807	5	1	5	1.657	−0.949	−0.934
SH1	3.479	4	1	5	1.587	−1.301	−0.517
SH2	3.311	3	1	5	1.505	−1.269	−0.335
SH3	2.941	3	1	5	1.259	−0.784	−0.144
XL1	3.437	4	1	5	1.565	−1.087	−0.768
XL2	3.723	4	1	5	1.489	−0.836	−0.858
XL3	3.605	4	1	5	1.666	−1.125	−0.81
XL4	2.916	3	1	5	1.382	−1.047	−0.099
XL5	2.983	3	1	5	1.455	−1.157	−0.053
SX1	3.168	3	1	5	1.404	−1.11	−0.23
SX2	3.605	4	1	5	1.626	−1.237	−0.66
SX3	3.521	4	1	5	1.505	−0.931	−0.804

TABLE 6 Study 2: The facet reliability and validity of each variable (social environment).

	Cronbach's alpha	rho_A	CR	AVE
eWOM perception	0.981	0.982	0.985	0.93
Hedonic well-being	0.967	0.968	0.975	0.885
Eudaimonic well-being	0.922	0.923	0.951	0.865
Social environment	0.907	0.908	0.942	0.844

Moderating mechanisms of the historical environment

Results

Similar to the previous studies, we first performed a descriptive statistical analysis of all variables in this study, as shown in Table 8.

TABLE 7 Study 2: Path coefficients under moderating effect (social environment).

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistic (|O/STDEV|)	*P*-value
eWOM perception → Hedonic well-being	0.516	0.512	0.031	16.916	0.000
eWOM → Eudaimonic well-being	0.674	0.676	0.052	13.079	0.000
Moderating effect 1 → Hedonic well-being	0.067	0.064	0.020	3.295	0.001
Moderating effect 2 → Eudaimonic well-being	0.110	0.111	0.040	2.762	0.006

TABLE 8 Study 2: Descriptive statistical analysis of each variable (historical environment).

	Mean	Median	Min	Max	S.D.	Kurtosis	Skewness
KB1	3.655	4	1	5	1.309	0.019	−1.136
KB2	3.619	4	1	5	1.422	−0.287	−1.096
KB3	3.699	4	1	5	1.336	−0.035	−1.123
KB4	3.832	4	1	5	1.534	−0.336	−1.145
KB5	4.018	5	1	5	1.517	−0.07	−1.28
LS1	3.673	4	1	5	1.484	−0.854	−0.753
LS2	3.496	4	1	5	1.415	−0.933	−0.532
LS3	3.106	3	1	5	1.193	−0.468	−0.303
XL1	3.646	4	1	5	1.439	−0.305	−1.093
XL2	3.938	4	1	5	1.378	−0.021	−1.183
XL3	3.841	4	1	5	1.538	−0.333	−1.15
XL4	3.124	3	1	5	1.338	−0.821	−0.252
XL5	3.195	3	1	5	1.407	−0.982	−0.217
SX1	3.327	3	1	5	1.327	−0.801	−0.416
SX2	3.805	5	1	5	1.51	−0.674	−0.929
SX3	3.743	4	1	5	1.4	−0.152	−1.119

Second, using standardized results for analysis, we obtained Cronbach's alpha coefficients greater than 0.8 for eWOM perception (shown in Table 9), hedonic well-being, eudaimonic well-being, and historical environment. We also found the reliability (CR) greater than 0.8, and the average extracted variance (AVE) was greater than 0.5. Among them, the Cronbach's Alpha of eWOM perception is 0.976, composite reliability (CR) is 0.981, and average extracted variance (AVE) is 0.912; the Cronbach's Alpha of hedonic well-being is 0.959, composite reliability (CR) is 0.968, and average extracted variance (AVE) is 0.858; the Cronbach's Alpha of eudaimonic well-being is 0.909, composite reliability (CR) is 0.943, and average extracted variance (AVE) is 0.846; the Cronbach's Alpha of historical environment is 0.887, composite reliability (CR) is 0.931, and average extracted variance (AVE) is 0.818. These results revealed a good convergent validity for each variable. Finally, we used Bootstrapping method to calculate each path coefficient and the corresponding T-statistic and value of p (as shown in Table 10). We found that eWOM perception had a significant positive effect on both hedonic and eudaimonic well-being ($\beta_{\text{hedonic}} = 0.544$, $p < 0.001$; $\beta_{\text{eudaimonic}} = 0.705$, $p < 0.001$). Moreover, the eWOM perception and historical environment interaction on hedonic and eudaimonic well-being were also significant ($T_{\text{hedonic}} = 2.825$, $p = 0.005$; $T_{\text{eudaimonic}} = 2.801$, $p = 0.005$).

Discussion

This part discovered that eWOM perceptions had a significant positive effect on hedonic well-being and eudaimonic well-being. Thus, hypothesis H1 was verified. The results also verified the significant moderating effect of historical environment in the relationship between eWOM perception and hedonic well-being and eudaimonic well-being. Moreover, a high level of historical environment has a more positive effect on tourists' livelihood well-being experience with high eWOM perceptions, as compared to a low level of historical environment. Hence, hypothesis H3c was also verified.

Conclusion and discussion

Discussion

In the present era of internet, communication based eWOM has attracted extensive attention from the industry and academia (Zhang, 2020). It has been considered imperative for tourism enterprises to explore the social strategy of tourism public opinion management. Combining the tourists' individual characteristics and environmental conditions can help to enhance people's well-being experience and their personal cultural rights (Luqman et al., 2018; Zhang, 2020). Therefore, this study analyzes the tourists' performance when they were exposed to eWOM contents. Moreover, it considered the moderating effects of individual characteristics and environmental elements to present the overall study findings. First, the interaction between eWOM perception and gender highlighted that women's hedonic well-being score is higher, and men's eudaimonic well-being score is higher under high eWOM perception. This suggests that in the travel selection process through eWOM content, women are more likely to seek pleasurable experiences to "top up" their happiness. Whereas men focus more on the cultural knowledge and heritage of the destination, which results in a more rational sense of self-actualization (Study 1a). Second, the interaction between eWOM perception and age, hedonic well-being was highest for older tourists, followed by young tourists, and lowest for middle-aged tourists under high eWOM perception. While eudaimonic well-being was highest for young tourists, followed by middle-aged tourists, and lowest for older tourists. It indicates that the travel selection process through eWOM content is dominated by relaxation among older tourists. Whereas young and middle-aged tourists are more interested in exploring the unknown and pursuing a sense of achievement (Study 1b). Finally, high eWOM perceptions positively affect tourists' livelihood well-being experiences (hedonic well-being and eudaimonic well-being) in a high-level physical, social and historical environment, moderated by environmental elements. It shows that if the local scenery, customs and historical culture can be combined in the process of eWOM communication, then the happiness of tourists can be improved (Study 2).

Theoretical implications

From a theoretical perspective, the findings of this study are important in the following ways. First, we verified the existence and applicability of livelihood well-being experiences in eWOM communication. That confirmed the tourists' eWOM perceptions can improve well-being by conveying the emotions and connotations of the destination (Tseng et al., 2015). Tourists are enabled to find their own values and positioning (Chen et al., 2018) and satisfying their tourism demands (Le et al., 2020). Secondly, under the topic of livelihood well-being experience, this study combined the viewpoint of Vada et al. (2019) to classify livelihood well-being experience as hedonic well-being and eudaimonic well-being. Where we analyzed the effect of eWOM perception on both of the dimensions of livelihood well-being experience. Moreover, based personal characteristics (gender and age) of tourists, the study showed the impact of the interaction between eWOM perception and individual characteristics on people's well-being experience (hedonic well-being and eudaimonic well-being). Such findings of this study helped to understand the relationship between eWOM perception and tourists' well-being experience. The study results provided a new perspective and enriches the applicable boundaries of word-of-mouth in the tourism field. Finally, this study synthesized prior literature to expand environmental elements in terms of physical environment (Dwyer et al., 2019), social environment (Tosun et al., 2021), and historical environment (Rahmafitria et al., 2020). The experimental study conducted in combination with attractions, meet these three types of environmental conditions. It revealed the relationship between perception of eWOM and livelihood well-being experience at different environmental levels, enriching the prior research results to some extent.

TABLE 9 Study 2: The facet reliability and validity of each variable (historical environment).

	Cronbach's alpha	rho_A	CR	AVE
eWOM perception	0.976	0.977	0.981	0.912
Hedonic well-being	0.959	0.959	0.968	0.858
Eudaimonic well-being	0.909	0.91	0.943	0.846
Historical environment	0.887	0.889	0.931	0.818

Practical implications

From a practical point of view, the findings of this study are important in the following ways. First, the study points out that eWOM perception can significantly and positively influence the livelihood well-being experience. Therefore, the tourism industry should establish online tourism websites, tourism applications, public numbers and WeChat Mini Program. This will help to gradually transfer traditional tourism services to various online tourism platforms, providing rich channels for tourists to share their knowledge, emotions, and travel experiences. In addition, the tourism service system should be continuously developed and improved, besides, a feedback mechanism should be established. Moreover, the existing deficiencies should also be corrected and improved in time, and more positive travel experiences should be provided. Thereby, it will enhance the happiness of tourists. Second, this study found that hedonic and eudaimonic well-being differed across gender and age groups in the eWOM communication process. Therefore, travel enterprises may design more personalized social media platforms. These platforms will allow travelers to not only select word-of-mouth messages that meet their own criteria, but also allow other specific groups to skim through their posted online reviews. The word-of-mouth visibility to other groups making eWOM communication more accessible and thus more targeted to meet tourists' travel service demands. Finally, the study concludes that the interaction between eWOM perception and environmental elements has a significant impact on livelihood well-being experiences. Therefore, the tourism industry should focus on environmental rendering and encourage local residents and tourists to describe the travel environment. The description of travel environment can be in relation to the physical landscape, social flavor, or historical culture of the destination. Moreover, the local residents and tourists can express their feelings, evaluations, and suggestions about the travel in the form of text, pictures, and videos on online platforms. This is an effort to optimize travelers' travel strategies and enhance their livelihood well-being experiences.

TABLE 10 Study 2: Path coefficients under moderating effect (historical environment).

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistic (|O/STDEV|)	P-value
eWOM perception → Hedonic well-being	0.544	0.539	0.037	14.784	0.000
eWOM perception → Eudaimonic well-being	0.705	0.711	0.067	10.505	0.000
Moderating effect 1 → Hedonic well-being	0.061	0.059	0.022	2.825	0.005
Moderating effect 2 → Eudaimonic well-being	0.116	0.118	0.041	2.801	0.005

Limitations and future research directions

Due to various subjective or objective reasons, this study has certain limitations. First, in terms of individual statistical characteristics, this paper only discussed the impact of the interaction between eWOM perception, gender and age on people's livelihood well-being experience. While, other characteristics such as education, occupation and disposable income, etc. also have impact on people's livelihood well-being experience. Therefore, the prospective follow-up studies can further explore this mechanism from the perspective of other individual characteristic elements. Second, this study only focused on the livelihood well-being experience brought about by eWOM perception. However, traditional word-of-mouth communication can also have an impact on livelihood well-being experience. That necessitates to conduct further experiments in the future to test the mechanism of the effect of traditional word-of-mouth perception and conduct comparative studies with eWOM perception (e.g., Luqman et al., 2017). Third, this study did not address the possible mediating variables involved. While eWOM perception may have an indirect effect on tourists' happiness through a series of mediating elements (e.g., travel motivation, destination image, etc.). Thus, future studies could expand on this aspect and further refine the findings of this study.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

XL and YW contributed to the empirical work, the analysis of the results, and the writing of the first draft. YJ supported the total work and advised the hypotheses development. XL, YW, and YJ discussed the results and commented on the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Reproduction, cultural symbolism, and online relationship: Constructing city spatial imagery on TikTok

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The city on social media has become a hot topic in the study of city communication and city image. From the perspective of spatial theory and the communication characteristics of social media, this paper divides the spatial imagery of TikTok into three spaces: material space-cognitive attention, mental space-mental association, and relational space-emotional involvement. Based on the content analysis of 40 videos, we analyze the process of social media using cognition, association, and emotion as the starting points to increase the material space, expand the mental space, and expand the relational space. We find that spatial imagery can be co-constructed from the material space, mental space, and relational space. Lastly, the model is changed, and the value of using spatial theory to understand how city images are made is talked about.

KEYWORDS

TikTok, city imagery, cultural symbolism, audience behavior, content analysis

Introduction

TikTok enriches people's lives with its vast information flow and ease of use, creating a convenient online communication platform between users. Users physically experience the specific space they are in, feel the people, objects, and scenery within it, and upload this process to the TikTok platform in the form of short video recordings with added topics and hashtags, which are pushed through the big data traffic pool to attract more likes, comments, and retweets from enthusiasts of the same genre, allowing more users to be present in the space (Yang et al., 2022) The location information revealed by the viewer's work is transferred from the virtual space to the physical space, triggering secondary communication and allowing different users to form different experiences of the same urban space. Before the emergence of short-form video communication, people's perception of a city's image was often created by DMOs or other professional organizations that branded the city and invested heavily in relevant media, such as TV commercials, to spread the city's image (Li Y. et al., 2020). In the current trend of convergence with the prevalence of short videos, the communication of city images is gradually changing from fixed-scale communication to personalized random communication (Wang and Feng, 2021). Because each person sees the city from a different perspective and has different interests, it enriches the city's image on a personal level. The many personal impressions of the city provided by media platforms allow people to have a more comprehensive understanding of the city (Su, 2020b). Studies of urban spatial imagery based on social media, especially Shake, are relatively rare and limited to the use of social media data for the identification of urban spaces and images (Liu and Zhang, 2020; Ye et al., 2021), not only for the visual perception of spatial entities, but also for the attention given to the social consciousness, terroir, and cultural factors that influence the formation of imagery in cities (Gulick, 1963; Rapoport, 2016). With the development of society, the Internet, with its prominent technologies of interactivity, visualization, convenience, and multiple participation, has changed the original mechanism of city image-making. The media function has gradually shifted from recording city imagery to extensive participation in city image-making. The deep integration of social media with everyday practices, in particular, has transformed culture's invisible into visible, establishing and creating new spatial imagery (Kong, 2020). We argue that, following the notable research of Wu et al. (2019), Kordel (2016), Gatrell and Collins-Kreiner (2006), social media users construct a spatial image of the city. This study focuses on two questions: (1) How to decompose the spatial imagery of the tourist city based on the spatial triad, and (2) How does the tourist city form a unique spatial imagery based on the communication of TikTok? This study analyses the content of city videos from four famous Chinese tourist cities (Xi'an, Changsha, Chengdu, and Chongqing) on TikTok. Based on the triadic theory of Lefebvre, the study explores the physical space, mental space, and relational space of the city through the spatial imagery constructed by TikTok. The research in this field is also made better by building a model of city spatial imagery based on TikTok.

Literature review

Social media and city image communication

When social media is used by public institutions, it is assessed as an innovative platform that allows these institutions to interact with citizens and other institutions (Criado et al., 2013). When social media is used by individuals, it is represented as a technology-based application that allows users to generate information and share this information (Kaplan and Haenlein, 2010). Social media, which has emerged in recent years with advances in communication technology, is shaping and changing marketing activities (Gulbahar and Yildirim, 2015), and Stankov et al. (2010) argue that they are "beginning to realize the importance of using the power of social media." Social media is participatory, interactive, open, and transparent; it is widely used in the tourism industry, making it an appropriate way to promote cities (Zhou and Wang, 2014). Firstly, organizations (for example, destination marketing organizations, DMOs) that use social media are likely to attract the attention of more internet users (Hays et al., 2013). Secondly, opinions and advice gained through social media, especially video reviews of tourism experiences and areas, will become increasingly important in destination management decisions (Tussyadiah and Fesenmaier, 2009; Pop et al., 2022). Again, many destination management agencies are using the influence of online personalities to attract visitors to their destinations (Gretzel, 2017; Femenia-Serra and Gretzel, 2020). People are constantly using social media before, during, and after their trip to share their travel experiences (Ketter, 2016). Thus, social media has become an essential marketing strategy for tourism promotion (Chu et al., 2020; Gretzel et al. (2000); Hjalager, 2010) also mention the importance of adopting social media practices in urban tourism marketing.

Recent research has highlighted the importance of building a destination image through social media (Shao et al., 2019; Jasmin, 2020). Short video content on social media, such as microfilms, has made destinations increasingly popular (Shao et al., 2016). Through social media, cities are able to communicate with and have access to the opinions of different target audiences (Mossberger et al., 2013; Haro-de-Rosario et al., 2018). Social media has now become an optimal platform to share and improve one's experience of visiting a city, where personal experiences and interactions are influencing people's perceptions of the city in question (Sevin, 2014). Therefore, it would be undesirable to not make full use of social media in the marketing of a city (Gümüş, 2017).

TikTok has been studied as an effective channel for destination marketing (Li Y. et al., 2021), for example, psychological studies based on TikTok that explain why people use it (Montag et al., 2019; Ahlse et al., 2020; Marengo and Montag, 2020). TikTok fits people's use and gratification (Katz et al., 1973; Shao and Lee, 2020), including the need for self-expression, sharing, and creation (Bucknell Bossen and Kottasz, 2020; Omar and Dequan, 2020),. In recent years, scholars have studied TikTok's notification of health-related information (Comp et al., 2021), published official government information (Jiang and Wang, 2020), public political discussions (Medina Serrano et al., 2020), uploaded travel content (Du et al., 2020), online live sales (Su, 2020a), and broadcast educational science (Hayes et al., 2020). During the epidemic, the most recent study analyzed the video content of the TikTok platform conveying COVID-19 messages (Li X. et al., 2021), as well as the narrative approach in video epidemic reports (Sidorenko-Bautista et al., 2021). However, TikTok has been studied mainly as a marketing tool due to its huge amount of data and users, it has thus become an important platform for city marketing (Lei et al., 2020), as TikTok can make a destination famous quickly (Wengel et al., 2022). Cao et al. (2021) studied tourism behavior associated with TikTok videos; some tourists used the app for archiving, social interaction, and searching for information about attractions (Han and Zhang, 2020). Overall, the combination of TikTok and city research lies in the fact that TikTok can be used for tourism communication with short video creation and sharing (Shi, 2021), enhancing the image of cities (Li H. et al., 2020; Su, 2020a), and building city brands (Wang and Feng, 2021; Song, 2022).

Spatial imagery of city

Boulding was the first to suggest that imagery is a condensation of people's subjective values and knowledge, a tool for communication between subject and object, and plays an important role in the subject's behavioral decisions (Boulding, 1956). Subsequent scholars, such as Crompton (1977) and Dichter (1985), have summarized the concept of imagery, and Lynch transposes imagery into urban studies, arguing that although residents in each city sense the city differently, it seems that each city has a common image, namely the spatial imagery of the city (Campos and Campos-Juanatey, 2019). Lynch identifies three components of an image: identity, structure, and meaning. Lynch also identified the elements of city spatial imagery, including roads, boundaries, areas, nodes, and signposts (Lynch, 1964). Many subsequent studies have adopted this classification (Young, 1999; Huang et al., 2021), and since then, the study of destinations based on city imagery has gradually become a hot topic of interest (King and Golledge, 1978; Marques et al., 2021). Although destination image research began in the 1970s, there is no clear definition in the academic community, and each scholar gives an interpretation based on their own research objectives (see Dadgostar and Isotalo, 1992; Echtner and Ritchie, 1993; Mac Kay and Fesenmaier, 2000; Bigné et al., 2001; Kim and Richardson, 2003; Tavitiyaman et al., 2021; Tasci et al., 2022). These explanations are mainly related to impressions, mental representation, and perceptual perception, which have been explored in many case studies on the process of forming destination images, the components of imagery, the factors influencing images, and the structural characteristics of imagery (Pearce, 1997; Hernández-Mogollón et al., 2018). Therefore, it can be considered that the early research on destination image began in the 1970s (Hunt, 1975; Crompton, 1979; Pearce, 1997). Researchers used the city imagery map approach to analyze the spatial imagery characteristics and patterns of the subjects (tourists) and objects (local residents) of various tourism activities in an attempt to propose a conceptual system of spatial imagery theory in the field of tourism (Pearce, 1997). In recent years, the study of spatial imagery in tourist destinations has received attention (Uusitalo, 2014; Kim et al., 2022). But the study of city images has had an effect on the study of spatial imagery in tourist destinations (Peng et al., 2020; Szubert et al., 2021), with too much focus on the spatial and structural analysis of destination cognitive maps (Jiang et al., 2009).

Walmsley and Jenkins (1992) argue that spatial imagery is the process by which people create mental images and schemas of objective objects through the recognition of their spatial characteristics. Imagery is an effective way of examining what impressions urban space leaves on visitors' minds, and it is not just a static cognitive image in the mind; it has an impact on residents' attitudes and behavior (Hayllar and Griffin, 2005; Amore et al., 2020), making spatial imagery an important theory and method for studying the subjective perception of urban space. Residents are both influenced and constrained by their surroundings and at the same time use them dynamically, resulting in direct or indirect experiential perceptions of their surroundings, forming a subjective environmental space in their minds (Pearce, 1999; Kitchin and Blades, 2002; Shoval, 2018; Balomenou and Garrod, 2019; Deng et al., 2021). Based on this beginning, urban spatial imagery has gradually progressed from basic research on imagery types, constituent elements, influencing factors, and formation mechanisms (Appleyard, 1970; Walmsley and Jenkins, 1992; Li and Katsumata, 2020) to the study of differences within imagery (Pacione, 2009; Koch and Latham, 2017). Studies on the spatial variability of city imagery based on socio-demographics, different social classes, and cultural differences within the city (Lathia et al., 2012; Liu and Cheng, 2020) are examples. Later on, more and more scholars began to focus on the environmental evaluation embedded in urban spatial imagery (Zhou et al., 2017) and the relationship between urban spatial imagery and citizens' activity behavior (Chen and Tsai, 2007; Lu, 2018; Weijs-Perrée et al., 2020). Specifically, the study of urban space has evolved from a focus on residents' perceptions to a focus on both residents and tourists (Zhao et al., 2020). In terms of research methodology, studies on the components of city spatial imagery still borrow more from Lynch's theoretical framework (Takeuchi and Perlin, 2012), mostly using imagery sketching and spatial data analysis methods. With the advancement of technology, GIS, GPS positioning technology, and mobile phone smart navigation technology are being used as new methods to obtain spatial data from tourists (Xia et al., 2008; Salas-Olmedo et al., 2018; Vaez et al., 2020).

In the field of city spatial imagery research, the hotspots are clustered in four areas: (1) the characteristics of urban spatial imagery as determined by a dynamic and comparative data analysis (Huang, 2002; Kitchin and Blades, 2002). (2) The effects of city spatial imagery, which is thought to influence residents' attitudes and behaviors (Hayllar and Griffin, 2005), such as influencing residents' evaluation of their activity experience (Smith and McGillivray, 2022), evaluation of the urban environment (Abass et al., 2019), behavioral choices (Prayag et al., 2017), attitudes towards urban resource management measures (Ramkissoon and Nunkoo, 2011; Hammitt et al., 2015), and urban image formation and communication (Bavinton, 2013; Hernández-Mogollón et al., 2018). (3) The formation mechanism of city spatial imagery; investigating the various influencing factors and causes of city spatial imagery; and comprehending the inner formation mechanism of city spatial imagery. The city environment and the residents are the primary influencing factors of city spatial imagery (Hunt, 1971; Pike, 2002). City environmental factors mainly refer to spatial structure (Pearce, 1998; Smith, 2005), city culture and urban construction (Appleyard, 1970), spatial and temporal distance, cultural differences, and economic level. The factors affecting city residents themselves mainly include gender and age; economy; experience; social class; education level; and value system (Peel and Lloyd, 2008; Bonakdar and Audirac, 2020). In addition, city spatial imagery is influenced by city events (Lee et al., 2005; Jeong and

Kim, 2019); advertising (Peel and Lloyd, 2008; Wang and Feng, 2021); marketing (Hospers, 2009; Deffner et al., 2020); and media (Stepchenkova and Eales, 2011; Li et al., 2018). (4) The creation of city spatial imagery is currently being analyzed from the perspective of the interaction between residents and the city environment, using imagery space and its composition to analyze the problems in the development of urban space (Zhang et al., 2009; Chen et al., 2022). Most of the studies, from a research point of view, have been done from the field of communication studies, using mathematical and statistical methods to look at the issues at hand. However, there aren't many case studies that look at how the audience perceives space.

Lynch's approach to city spatial imagery was limited by the time period, as the investigation process needed to be based on the subject's personal experience of the physical urban space (Lee and Schmidt, 1986; Hátlová and Hanus, 2020), and Guy et al.'s (1990) study of Wurzburg, Germany, showed that field experiences had the most profound impact on the spatial cognitive processes of tourists. Previous studies on spatial imagery in urban tourism have thus concentrated on the city's physical tourism space, employing more tourism cognitive maps and interview research methods. However, there are also convergences and innovations, and technical approaches from different disciplines such as geography, sociology, and psychology have been effectively integrated into the study of city spatial imagery (Echtner and Ritchie, 1993; Son, 2005; Oteros-Rozas et al., 2018; Lalicic et al., 2021). In recent years, there have been a number of examples of the use of mass media such as television and film to study city spatial imagery (Massood, 2011; Wen et al., 2018). As online technologies have penetrated the media landscape, online media have gradually become a platform for urban tourism research, but research based on online texts has mostly focused on the perception of city images (Pikkemaat, 2004; Choi et al., 2007; Sugandini, 2020; Chen et al., 2022) and rarely extended to the study of spatial imagery in urban tourism. This paper conducts a study of spatial imagery in cities based on online content, i.e., the videos and texts of TikTok. It not only uses the method of studying spatial imagery with online content, but it also adds to the research on how people see spatial images of cities.

Research method

Case selection and data origin

The selection of the case was divided into two steps: the selection of the case city and the selection of the city's TikTok videos.

In the first step, TikTok China was selected as the short video platform for this study. TikTok China was searched for the names of 34 cities in the list of "Excellent Tourism Cities in China" published by the China National Tourism Administration (see Appendix 3). The 34 cities were then ranked by the total number of videos, likes, and favorites on the TikTok China platform, and the top four cities were selected: Xi'an, Changsha, Chengdu, and Chongqing.

In the second step, the top 10 videos from the four cities were ranked in descending order by the number of likes for further video selection. The top 10 videos in terms of the number of likes were selected, and the main contents of the videos could not be duplicated, so that the famous places in each city were ranked according to the number of likes. Appendix 2 presents a detailed list of the famous tourism sites that appear in the TikTok videos for each of the four cities and the number of times they appear. After obtaining the names of tourism sites in each city's TikTok videos, we searched for videos by searching for the keywords "city name + tourism site name" in April 2022 and obtained the top 10 videos with the highest number of likes in each of the four cities. In total, 40 videos were obtained.

Data analysis process

In this study, all videos were open-coded using a qualitative content analysis approach. Following the theory of Lefebvre (2003, 2012) and the characteristics of the research object of study, the conceptual model was constructed (see Figure 1). Based on this model and the coded content, the study analyses the physical, mental, and relational dimensions of city spatial imagery. The research question is answered by exploring and answering the following three sub-questions: Is there a before and after change in the physical dimension of the tourist space in the video? Is there a new mental symbolism in the tourist space? Does the tourist space have any realistic relevance to a wider range of people? The role that TikTok played in these three stages of change is also looked at in the context of how TikTok works as a media platform.

Research findings

Based on the aforementioned data selection, this study identified the following four cities for their main video content. The famous hit spots in **Xi'an** city include Bell and Drum Tower, Xi'an City Wall, The Great Tang Dynasty City of Night, Big Wild Goose Pagoda, and Terracotta Warriors; the famous hit spots in **Changsha** city include Super Wenheyou, International Finance Centre (IFC), Orange Island, Yuelu Mountain, and May Day Square; the famous hit spots in **Chongqing** city include Liziba Light Rail, Hongya Cave, Yangtze River Ropeway, Kui Xing Lou, White Elephant House, and Chuan Mei Graffiti Street; and **Chengdu** city include Chunxi Road, Kuanzhai Alley, Jinli, Panda Base, and Wuhou Temple. We can see that the number of likes on some of these videos is in the hundreds of thousands or even millions, and the number of favorites, comments, and retweets is also high. The city's famous spots are popular on TikTok (Zihan, 2019; Dexing, 2020).

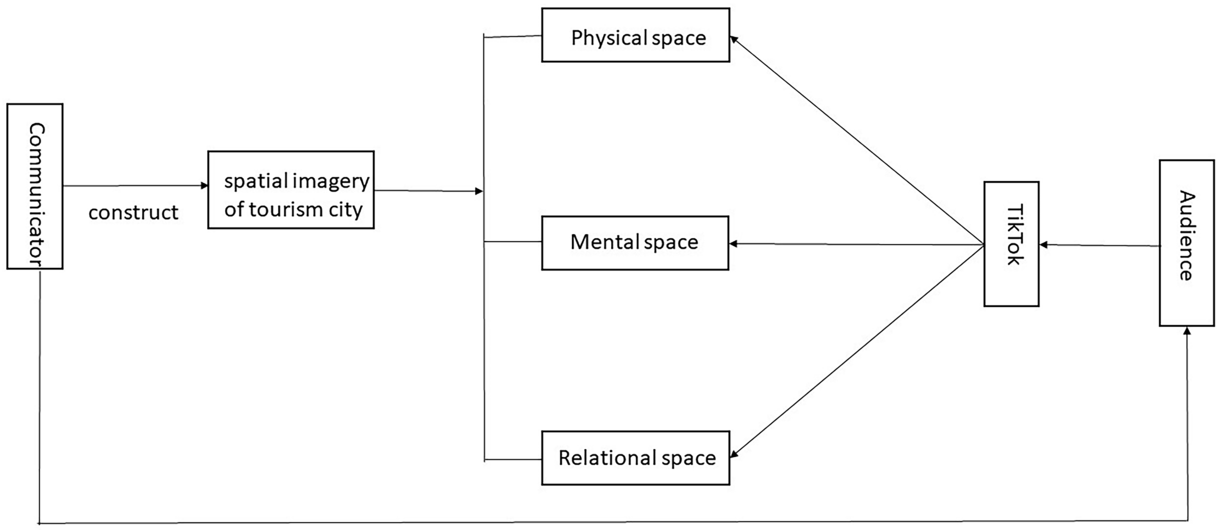

FIGURE 1
The physical, mental, and relational imagery of a tourism city.

Changing the physical dimension of the city by drawing the audience's cognitive attention

Physical space is the physical presence of spatial imagery, which can be accurately measured, depicted, and designed with the help of instruments and tools within a certain range, and its corresponding space has a physical form, a dimension that can be perceived by touch (Wu, 2011). The physical space of a city refers to the architectural design, street layout, and texture of its landscape and involves the possibility and convenience of human mobility and interaction (Sun, 2018).

The physical spaces are mainly analyzed through the video content (see Appendix 1 Pictures 1–6). Appendix 1 Picture 1 is the Xi'an City Wall, the largest city wall remaining with over 1,600 years of history; Appendix 1 Picture 2 is Orange Island, a famous political site in China; Appendix 1 Picture 3 is Hongya Cave, which features a gloriously lit and strange landscape; Lulu (2021) is the Datang City of Night; Appendix 1 Pictures 5 and 6 are the Taikoo Li naked eye 3D screen and the Li Ziba light rail tram, which feature visual stimulation. The reason for the high popularity of these videos is twofold: on the one hand, it is that the spaces of the hit places in the videos, as shown in Appendix 1 Pictures 1–6, all have the characteristics of physical space that attract tourists, and they all have the characteristics of visual stimulation, such as being large and strange at the level of physical form. The video production, on the other hand, fits the "short, fresh, and fast" characteristics of the short video platform (Shen, 2019), which quickly pushes visually impactful images to the users' eyes in a short period of time, stimulating their visual senses and mapping the physical form of the city; at the same time, the selection of music or accompanying text that has recently been popular on social media. The campaign also used songs or texts that have been popular on social media lately, which brought more people to the internet.

Of the TOP 100 city promotion videos played on the TikTok platform, "more than 80% were created by individual users" (TikTok Headline Index, Urban Branding Research Office, Tsinghua University, 2018). In these videos, tourists evaluate the original physical space on the basis of their existing perceptions, and the features that are unearthed or discovered are edited by tourists into informative content and uploaded to social media. For example, Li (2018, 2022) shows a visitor's uploaded carriage of the Chongqing Yangtze River Ropeway scenic spot. After gaining a high level of cognitive attention on TikTok, the carriage of the Chongqing Yangtze River Ropeway scenic spot is then replaced with a new paint job in a video later uploaded by the visitor. Another example is that after Liziba Metro Station gained online attention on TikTok, the local managers deliberately added a viewing platform to meet the demand of tourists to take and make photographs (see Picture 7 in the Appendix 1). As a result of the influence of social media, the local authorities will transform the physical space according to the popularity of the spot. To keep up with the popularity of the videos, the Changsha government made special pink zebra crossings for a local festival and heart-shaped traffic lights for Valentine's Day (see Picture 8 in the Appendix 1) to match the festive atmosphere.

The distinctive physical forms paired with the techniques of TikTok video production can quickly draw attention to the TikTok platform's traffic recommendation, sharing, and forwarding functions, and the physical spaces attract more attention and expand audience awareness (both resident and tourist) of these physical spaces due to the fission spread of social media. The managers transformed the spatial cities according to the popularity of the TikTok videos and the needs of the visitors, and the local tourism management department played the role of active transformation while making reactive adjustments. This is a new phenomenon in China's urban renewal process, which validates that the creation of internet influencers is not only limited to individuals but is transforming urban physical spaces

(Li Y. et al., 2020). Whether the local government is passively changing or actively making new things, it shows that physical spaces are always being made better because of the attention they get on social media.

Enlarging the mental dimension of the city by triggering psychological associations

The representation of mental space is the conceptualization of knowledge, symbols, and order by scientists, planners, urbanists, and others, and its counterpart is the space occupied by sensory phenomena, which is a constructed dimension (Wu, 2011). TikTok's video content comes from how visitors choose to filter and edit their videos. This makes TikTok's video content a "consciously processed space" that shows the real physical qualities of space and gives it a mental dimension because of how people process it.

The formation of a mental dimension is twofold. Firstly, there is the generation of spiritual symbols in space. Every TikTok user who registers an account has the power to post videos and is then entitled to participate directly in the construction and dissemination of urban space. For example, Jinli is a quaint stone street and riverside pavilion next to the Wuhou Temple to Chengdu residents, but in TikTok's, Jinlin is not only about snacks, an ancient theatre, and the Adu Well, but also the "First Street of Western Sichuan," the "Chengdu version of Qingming Shanghe Tu," and the "Three Kingdoms Culture" (hashtags in TikTok videos). Through the spread of TikTok, these cultural symbols arouse the audience's associations and are integrated into the construction of the city's spatial image (see Picture 9 in the Appendix 1). Chengdu Heming Tea House became a new TikTok hot spot in May 2020, following the end of the city quarantine. The tea house has become a space for boat cruisers, tea drinkers, card players, and ear pickers, as well as a window for cultural exchange and spiritual interaction between locals and tourists from all over the world. While satisfying cultural and spiritual needs, they have also created new spiritual symbols. It is worth noting that nearly half of the videos in the TOP 100 on the TikTok platform contain the challenge hashtag (see example in Appendix 1; TikTok Headline Index, Urban Branding Research Office, Tsinghua University, 2018). As shown in the red box circled in the example in Zhihong (2020, 2021), multiple users create videos around the same topic, and short videos with added challenge tags receive better recommendation priority. Through this challenge, the video platform can get more users to make videos and reach a wider audience. This will help tap into new symbols and give the space more spiritual and symbolic symbols (Zhihong, 2020, 2021).

Secondly, there are interpretations of mental symbols in space. Although the reader can produce a concretized reading from different perspectives, what is ultimately left in the mind is not a specific text or a complete part of a text but a condensed gestalt that remains in the viewer's mind that can correspond to spatial forms and play with subjective associations (Kauffka, 1997). Archetypal imagery is physical and has trans-subjective qualities, and the reader is able to respond to its materiality and qualities in the same way, such as the warm and restful feeling of house imagery (Gaston, 1964). In Appendix 1 Picture 11, the video shows the "forever street" of Changsha Super Wenheyou, the childhood kiosk, the lay-off brand of stinky tofu and the alleyway pig's feet, leading to the "old Changsha," "eighties," "three-dimensional scene-based food magic formula," "Taste of Changsha" and other symbolic meanings from Chinese literature and films related to the city, reinforcing the spatial imagery of Super Wenheyou. And combined with the comments shown in Appendix 1 Picture 12, we can see that in TikTok's video, these symbols are naturally able to decode the spiritual symbols conveyed in the video and associate with the spiritual space of the tourist destination as they are edited and presented in a modern discourse. In addition, in Appendix 1 Picture 13, the spaces are tagged during the display process and are constantly mentioned through the TikTok platform, so that audiences will associate the corresponding space when they see the video tag, for example, the tag "Chongqing 8D Magic Space" which corresponds to the space of the Li Ziba light rail station where the train passes through the building, the Cathay Art Centre, which is made up of several three-dimensional chopsticks stacked on top of each other, and the road like waves in Chongqing city.

The original contents posted by individual TikTok users and the associations based on films, music, literature, and other texts can add new spiritual and cultural symbols to the physical space; the participants are not limited to local residents who have already formed a stereotype of the city but also include tourists with different purposes of travel. The different content and styles of photography that different tourists focus on continue to trigger mental associations and thus generate spiritual symbols; the challenge of the hashtag motivates more users to associate with the same space, leading to the creation of spiritual symbols. Thus, the mental space is continually replenished and expanded. The modern style of the story and the way that the labels correspond to the space make it possible to figure out what the spiritual symbols in the space mean and how they relate to the physical space.

Expanding the relational space of the city by guiding the audience's emotional involvement

Relational space is the overarching dimension of social relations, co-created by the participants in spatial practices, and its counterpart, the social space, is the dimension in which people live (Wu, 2011). People's relationship to the past also includes a connection to space (Stephanson and Jameson, 1989).

In Pictures 14 and 15 of Appendix 1, the transformation of the phenomenon of fan-circleisation (the online gathering of fans) into a real space is illustrated. The video in Appendix 1 Picture 14 shows the filming location of a Chinese film, and most of the commenters on the video are fans of the film, with the comment section gathering a large number of fans of the male protagonist who say they would "love to go to the filming location in person." So in Appendix 1 Picture 15, we can see the fan groups gathering at Chongqing's Railway High School, Kui Xing Lou, Crown Escalator, and Zhongshan 4th Road to take photos and make these spaces interactive with people, creating a relationship between space and people. In Appendix 1 Picture 16, Xie Xiaojiu, the 'Master of Nine' from Xi'an, sings about the city and attracts many folk singers to join him. Based on the emotional identity of the music, residents and tourists came to and performed at the South Gate of the City Walls in Xi'an City. Wang and Xu (2021) say that the new Internet business model in China tries to get and control huge amounts of data to understand how users feel and what they want. Based on big data recommendations, TikTok suggests these video contents to users who like the film, the protagonists, or certain topics. This increases the number of people who follow this video, which can be turned into more offline experiences.

According to the narrative, the space on TikTok can be divided into story space and discursive space. The former refers to the present context in which the act or story takes place, while the latter refers to the narrator's space, including the context in which the narrator tells or writes (Herman et al., 2010). Most of the videos are dominated by the narratives of TikTok users, and the narrator is often the experiencer of the space. In Lulu (2021), TikTok users act as narrators, using real punchline photos and narration to create a sense of authenticity. The relaxed, chatty video copy quickly closes the distance between the viewer and the audience, gaining likes and retweets. This authentic and intimate approach brings the viewer closer, creating an emotion of trust that makes the viewer yearn for the punching place as well. Social media's ability to make people feel like they are there can also be very evocative. This happens when the setting of the act or story overlaps with the narrator's space, creating a great sense of immersion and making people want to go there.

The algorithm-based TikTok platform accelerates and amplifies emotional relationships online, enabling the transformation of real space. The stories in the videos are based on the real-life experiences of the narrators. They are paired with intimate chatter that creates a sense of being there and can make viewers feel connected to the space in the video.

Conclusion and discussion

The first aim of this study is to explore how to decompose the shaping of spatial imagery in tourist cities. Several studies have been conducted in the past (see Gatrell and Collins-Kreiner, 2006; Kordel, 2016; Wu et al., 2019), but the case in this study focuses on the social media (TikTok) platform to analyze how tourist cities have formed unique spatial imagery based on the communication of TikTok. This is also the second aim of this study: to explore the model and ways of shaping spatial imagery based on the communication of the TikTok. Previous studies have demonstrated that social media can be a communication channel for tourism promotion and city image enhancement in tourist cities (Hjalager, 2010; Zhou and Wang, 2014). The results of this study show that TikTok can also effectively contribute to the construction of spatial imagery in cities through three dimensions: physical, mental, and social relations. At the physical level, the study demonstrates the importance of the cognitive attention that TikTok can trigger, as characteristic spatial forms are quickly recognized in the TikTok medium and provoke people to attend, so that those who visit will recreate the spatial forms and post them on the TikTok platform, and the recreated works will attract official attention for the augmentation of physical spaces in the city. TikTok, on a mental level, becomes a platform for tourist cities to discover spiritual symbols such as history and culture, and its incentives encourage users to combine texts such as music, literature, film, and television with relevant tourist cities, thereby continuously expanding the spiritual connotations in spatial imagery. The result of text analysis in the video supports the idea that an increase in spiritual symbols will help people identify more with this city. At a relational level, TikTok supports the presence of the fan community (Fathallah, 2020; Lynch, 2022), and the tourist city will touch on an element of fan culture that triggers a large number of people to interact with the space, and the research confirms that emotions can be the link that expands the relational space. TikTok therefore plays a mediating role in all three dimensions of space: physical, mental, and relational, thus assisting in the construction of spatial imagery in the tourist city. Furthermore, the findings confirm that tourist cities with a deep historical and cultural heritage have a great advantage in the production of spiritual space, such as the Tang Dynasty culture in Xi'an. The unique cultural elements in a city are spiritual symbols that are not replicable, and this study therefore argues that tapping into irreproducible spiritual cultural symbols and shaping irreproducible spatial imagery is crucial for the communication of tourist cities. Based on the aforementioned content analysis and the above findings, this study improves the conceptual model (see Figure 2) to better apply to the analysis of city spatial imagery on TikTok.

Beyond the spatial dichotomy: The subject-object cycle in the three dimensions of space imagery

This study not only adds to the study of spatial imagery in tourist cities and related spaces but also makes three contributions to research in related fields. Firstly, this study constructs a model (see Figure 2) by introducing the mediating role of TikTok, which empowers a way of thinking about the construction of spatial imagery in tourist cities. The logic in the model clarifies which features of social media are utilized and which landing points can interfere with the three dimensions of spatial imagery. It extends the perspective of constructing spatial imagery through organizations or local authorities (Ramkissoon and Nunkoo, 2011; Hammitt et al., 2015) by highlighting the role of the social media user (the audience) in the construction of spatial imagery. The second contribution is that the findings show a cyclical construction of the

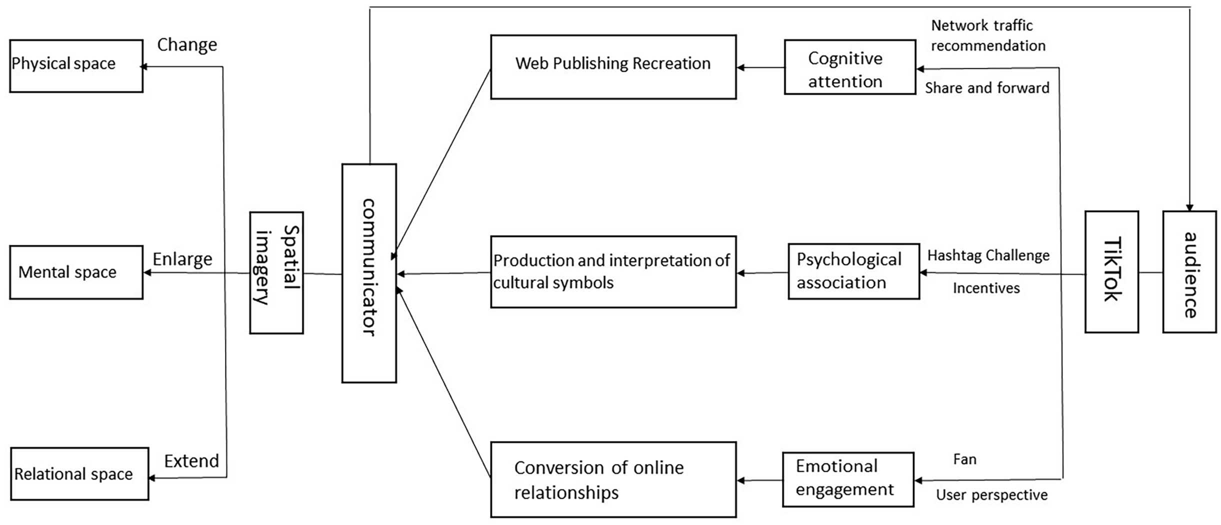

FIGURE 2
Physical, mental, and relational imagery of city on TikTok (PMRT model).

communicator and audience in the three dimensions of spatial imagery. While the communicator (here referring to the organization or agency that constructs and communicates the city image) constructs spatial imagery through physical, mental, and relational imagery, the audience is able to participate in each level of spatial imagery construction through the media advantage of TikTok, thus influencing the city managers' adjustment of spatial imagery. When the adjusted spatial imagery is disseminated through TikTok, the actions of the audience in turn influence the construction of spatial imagery in the tourist city. Thirdly, the formation of spatial imagery in this study confirms that space (the city) is no longer a dichotomy between physical and mental (Milevsky and Moshe, 1997; Bystrowska and Dolnicki, 2017), that the spiritual symbols of space are dependent on the forms of physical space, and that relational space arises as a fusion of physical space and spiritual space. Also, the existence of relational space affects the physical forms and spiritual contents of the space, which in turn affects spatial imagery, and the continued existence of relational space ensures that spatial imagery will last.

Shaping spatial imagery based on the PMRT model: The practical implications

The PMRT model can serve as a conceptual and operational guide for tourism city managers looking to shape their city's image. Faced with a competitive tourism industry and diverse communication channels, tourism city managers have also been exploring how to better promote and publicize their cities. The shaping of spatial imagery realizes the psychological link between the city and people, so that the image of the tourist city does not only stay at the level of material forms but can communicate and exchange with people in spirit, thus promoting the interaction between people and the tourist city and the relationship with this tourist city. The PMRT model points out that city images can be constructed from three dimensions of city imagery: physical space, mental space, and relational space based on cognitive attention, mental association, and emotional engagement (see Figure 2). Specifically, through TikTok's traffic recommendation, commenting and sharing, users re-create post contents; through tag challenges and incentive mechanisms, produce and interpret urban cultural symbols; and based on their own perspectives and fan group activities, they realize the transformation of online relationships.

Although the role played by city managers in city image communication is crucial (Booms and Bitner, 1980; Krupskyi and Grynko, 2018), the PMRT model highlights the importance of the audience, which includes both residents and tourists. And it advocates the need to think about residents in city image communication (Braun et al., 2013) and the power of the social media user (Sevin, 2014; Wang and Feng, 2021). The process of constructing city images can make full use of the advantages of social media to realize the co-creation of city imagery.

Limitation and future research

We must acknowledge that the study has certain limitations. Firstly, this study was conducted in a single setting, i.e., it was limited to Chinese cities. Future studies should therefore go further to validate the model and apply it to cities worldwide in order to generalize the findings. The limitations of the study, in addition, are its context and generalizability outside of China, as it is quite a different market from the rest of the world. It is important to note that the case data collection for this study was limited to China. Therefore, it is worthwhile to conduct a cross-cultural study. Furthermore, TikTok is only one type of social media platform, and although it is extremely representative, it is still important to conduct validation of other social media types if the study is to be applied to social media. This is also a direction for future research.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

NL and BZ contributed equally to this work and share the first authorship. NL and BZ contribute to the design and implementation of the research; XS and SH collect the data and conduct analysis of the results. All author contribute to the writing of the manuscript.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.1080090/full#supplementary-material

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How to promote the hierarchical diagnosis and treatment system: A tripartite evolutionary game theory perspective

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Due to the disorderly access to medical care and inefficient use of health resources, the advancement of the hierarchical diagnosis and treatment is more valued in promoting health system reform. Hence, this article integrates prospect theory into an evolutionary game model of the local government health departments, the medical institutions, and the patients in the system promotion of the hierarchical diagnosis and treatment. The simulation shows the specific influencing mechanism of the psychological perceived value of game subjects. Then by introducing the stochastic evolutionary game model, the system promotion under different medical cultures is also discussed in detail. The results indicate that for local government health departments, the amount and duration of financial subsidies are the key factors influencing the game system's evolution. For medical institutions, participating in the hierarchical diagnosis and treatment system is relatively beneficial. For patients, the recovery rate in primary hospitals matters more than the cost of treatment. Changes in the risk sensitivity coefficient will cause the equilibrium of the game system to change. However, changes in the loss avoidance factor do not change the equilibrium and only have an impact on the speed of convergence. With the health departments' intervention, patients in rural medical culture are more inclined to support the hierarchical diagnosis and treatment system than those in urban or town medical culture. Therefore, in order to promote the hierarchical diagnosis and treatment system, this article recommends that more attention should be paid to the regulatory role of health departments and the participation improvement of medical institutions and patients.

KEYWORDS

hierarchical diagnosis and treatment, evolutionary game theory, prospect theory, stochastic disturbance, medical cultures

Introduction

Since the implementation of reform and opening up, China's public health system has been gradually improved and the scale of medical services has been further expanded (Yip et al., 2019). However, at the same time, the construction and improvement of the medical service system have faced developmental difficulties, which leads to hardship in implementing a national hierarchical medical treatment system in China and other developing countries (Xie et al., 2022). First, the irrational distribution of medical services at all levels of medical institutions has led to the overcrowding of secondary and tertiary hospitals and the underutilization of resources in primary-level health care institutions (Liu et al., 2017). Second, due to the "inverted pyramid" structure of urban and rural health care resource allocation (Yi et al., 2020), the problems of disorderly access to medical care and inefficient utilization of health resources as a whole have begun to emerge (Sun and Luo, 2017), which not only affects the operational efficiency of the medical service system but also increases the medical expenses of patients, thus increasing their financial burden and the pressure on health insurance funds (Li et al., 2021). In response to these problems, China State Council has implemented a hierarchical diagnosis and treatment system (HDTS), the connotation of which is that, according to the priority of the patient's disease and the difficulty of treatment, medical institutions of different levels are responsible for the treatment of different diseases, while timely and convenient two-way referrals are made according to the changes in the condition so as to establish a scientific and orderly treatment and to ensure that patients receive appropriate treatment (Liang et al., 2019). Thus, promoting the construction of HDTS can guide patients to seek medical treatment in an orderly manner, to continuously optimize the allocation of health resources, to alleviate the contradiction between supply and demand of medical services, and to control the unreasonable rise of medical costs so as to effectively solve the problem of difficult and expensive medical care for residents (Huo et al., 2019).

For the exploration in the field of the public health system, researchers mainly conducted empirical analyses from the perspective of the integrated implementation of primary-level care as well as a referral system, which mainly connotes the division of labor between general practitioners and specialists in cooperation (Stirbu et al., 2011), and some scholars also studied the integration of health services (Li et al., 2011), and through in-depth studies, researchers found that it is essential to achieve consistency and collaboration among various departments within the health system (Gao et al., 2020). Further integration of existing health care resources to improve the utilization of health care resources is the main point of discussion at present, and relatively few relevant studies have been conducted considering the specific problems in the Chinese health care environment and the decision-making of participants in HDTS.

Along with rapid economic growth, China has achieved a relatively rapid increase in health care expenditure as a proportion of GDP (Jakovljevic et al., 2022), but there is still room for improvement compared to developed countries such as the United States, Canada, and France (Lopreite and Zhu, 2020). At present, the problem of scarcity of medical resources in China has been alleviated, but the distribution of medical resources, especially high-quality resources, still needs to be addressed (Liu et al., 2008). In addition, under the influence of the traditional concept of medical care, Chinese patients tend to go directly to tertiary hospitals for the first consultation and are often reluctant to consult primary medical institutions due to distrust of treatment effectiveness and dissatisfaction with medical services (Zhang et al., 2018).

The establishment and implementation of HDTS is a key task needed to be accomplished to realize the reform of the medical and health system under the unique medical culture of China. The effective implementation of this system cannot be achieved without the cooperation of government health departments, medical institutions at all levels, and patients (Liu et al., 2008). Therefore, studying the internal coordination and decision-making of HDTS can further optimize the operating mechanism of the system (Ma et al., 2008), realize the synergy of multiple participants, and ultimately build up a new pattern of medical care which enhances the sense of wellbeing in seeking medical care for Chinese residents.

Existing studies on the implementation of HDTS center on the following aspects: (1) suggestions for the development of primary care based on modeling and empirical evidence (Woodruff, 2022), (2) the regulatory role of health insurance (Hennig-Schmidt et al., 2011), and (3) referrals and cooperation between general practitioners and specialists (Ringberg et al., 2014). Recently, factors such as government subsidies and the efficiency of medical services have been the focus of discussion.

Existing literature on HDTS is mainly about two-sided games and seldom considers constructing a tripartite game model. Most relevant studies had not taken into account the limited rationality of decision-makers and the influence of external unstable factors on HDTS. Therefore, our research analyzed the influence of risk sensitivity and loss aversion of government, hospitals, and patients on the optimal results based on prospect theory and also present the impact on decision-makers under the influence of psychological factors through simulations. Further, we analyzed the random interference of uncertainties such as changes in the operating environment of the health care system and unexpected personal situations of patients to make the analysis results more related to the actual situations in China. The associations of psychological factors and promoting HDTS are further explored when our study represents one of the first attempts to introduce prospect theory and stochastic disturbance to optimize the game model. It will be helpful to enrich the existing relevant research and provide a basis for further in-depth studies.

Literature review

Hierarchical diagnosis and treatment and the decision-making of each subject

Medical services for common diseases are in great demand, and these kinds of diseases should be addressed in primary-level care institutions due to the regularity (Yang et al., 2021); the difficult and serious diseases, which have a lower incidence and are more difficult to treat than common diseases, need to be treated in secondary and tertiary hospitals with high quality medical resources (Shen et al., 2019). However, the improvement in the standard of living and accessibility of medical services has led to a tendency for residents to choose secondary and tertiary hospitals for the first consultation after suffering from diseases, making tertiary hospitals, which are supposed to mainly treat difficult and critical diseases, overcrowded (Li et al., 2020). The "siphon effect" of tertiary hospitals is serious (Wu Q. et al., 2022), driving the number of patients to decrease rapidly in primary-level care institutions (Zeng et al., 2020), which is contrary to the goal of promoting HDTS, and this problem needs to be solved urgently. This phenomenon is related to patients' medical concepts and habits (Chandra and Staiger, 2007), primary care service capacity (Jian et al., 2019), public health policies (Maxwell et al., 2008), and the cooperation mechanism of medical institutions at all levels (Li et al., 2017). Therefore, the formulation and promotion of HDTS require the coordination of local government health departments, medical institutions at all levels, and patients (Jian et al., 2019).

First, the government health department should consider the comprehensive background to formulate precise and effective policies, while supervision is needed at all levels to put various policies into practice (Huang, 2014). Along with the accelerated urbanization process and the implementation of the rural revitalization strategy (Meng et al., 2012), the government can adjust health expenditure policies flexibly and give full play to the role of the market (Song et al., 2020). In the specific implementation process, the government can require subordinate departments and medical institutions to participate in optimizing the medical service environment through incentive and punishment mechanisms (Whetten et al., 2006). Second, active cooperation between medical institutions helps build an integrated health care system (Stock, 2015), which can achieve effective utilization of medical resources through information sharing (Caine and Hanania, 2013). The rational layout and orderly sinking of medical resources can reduce the "siphon effect" of tertiary hospitals (Wu X. et al., 2022). Finally, patients tend to judge the quality of hospital services based on whether they can provide the facility to treat major diseases or perform difficult surgeries (Niu et al., 2019), which is the fundamental reason why community-level medical institutions are not trusted by patients (Sanders et al., 2015). Choosing tertiary hospitals for the first consultation without complying with HDTS not only increases medical expenses (Dong et al., 2019) but also results in additional waiting costs for patients (Yin et al., 2018). In addition to the waiting time, the treatment rate and the reimbursement rate of medical insurance will also affect the patient's decision to seek medical treatment (Klest et al., 2016). The evolutionary game model is used to deduce the evolutionary conditions and evolutionary process of the participants in HDTS and then to analyze the main influencing factors of the participants in the decision-making process. Related studies portrayed the evolutionary game paths of decision-making subjects in public health emergencies (Fan et al., 2021), and some scholars analyzed the optimal strategies of three entities, namely, system providers, hospitals, and the government, in the context of mobile medical systems, emphasizing the positive role of government regulation (Yuan et al., 2022).

Application of prospect theory in the evolutionary game

Most of the game models are constructed based on the premise of objective gains and losses, and the finite rationality of the decision subjects is not sufficiently considered. However, in the actual analysis, the perceived gain and loss of each subject in the game model will have a more significant impact on their behavior, which means that the game subject is essentially finite rational, so the introduction of prospect theory can make the model used in the study more suitable for the actual situation. Prospect theory, jointly proposed by Daniel Kahneman and Amos Tversky, belongs to a branch of cognitive decision theory within the descriptive research paradigm in political psychology, which is a combination of psychology and economics and is often used to study subjects' decisions under uncertainties in social sciences. Prospect theory considers psychological preferences and quantifies them in people's behavioral decisions. Most of the current studies used the parameters of the value function and probability weight function proposed by Kahneman and Tversky, specifying the exact values of the different parameters. According to prospect theory, decision-makers' perceptions of losses and benefits are asymmetric. The primary motivation of decision-makers is loss avoidance rather than benefit pursuit, so decision-makers tend to be risk-seeking when facing losses and risk-averse when facing benefits, and thus, preferences are probabilistically non-linear (Barberis, 2013). Prospect theory suggests that subjects in a decision-making position place more importance on the amount of change in benefits than on the final quantity (Grinblatt and Han, 2005).

Currently, prospect theory has been widely used in evolutionary game models to study the influence of psychological factors of subjects on decision-making, and some scholars used prospect theory to analyze the influence of risk factors on addictive behaviors (Cabedo-Peris et al., 2022). Prospect theory also has a wide range of applications in health care research, and one study based on prospect theory has contributed a new methodological approach to the ongoing efforts toward evaluating public health surveillance, revealing that patients tend to underestimate benefits and overestimate risks (Attema et al., 2019). Also, studies argued that prospect theory can optimize disease identification methods (Castiglione et al., 2017). Related studies considered the impact of global awareness and risk aversion factors of decision-makers on the evolution of the game system under prospect theory (Alfinito et al., 2018), and some scholars argued that the recommendation of consumer subjects can bring subsequent trust gains and profitability to operators (Kumar et al., 2010). A study was conducted to analyze the behavioral decisions of insured patients, providers, technology companies, and policymakers in the context of technological advances in conjunction with prospect theory (Khan et al., 2022).

Stochastic evolutionary game model

The classical evolutionary game theory treats each game party as a community rather than an individual, and each member of the community may not be able to adopt the strategy that maximizes its own gain at the initial moment but gradually adjust its own strategy in the process of the continuous game so that its own gain is constantly optimized.

The disadvantage of this approach is that it does not take into account the fact that the game parties cannot always maintain rationality in the process of strategy adjustment. Uncertainties, such as the influence of factors such as difficulties in obtaining information and fluctuations in gains, cannot be reflected by the traditional evolutionary game model (also called the deterministic evolutionary game model) (Ajmone Marsan et al., 2016). Thus, researchers constructed a stochastic evolutionary game model. Different from the concept of evolutionary stable strategy in the deterministic evolutionary game model, researchers proposed the concept of stochastically stable strategy (SSS) for stochastic mutation stability. The biggest difference between stochastic and deterministic evolutionary games is that the former takes into account the complexity and variability of the real situation, and instead of simply writing the law of probability change over time as a deterministic formula, a stochastic perturbation term is introduced.

Under the influence of external random perturbations, individual judgments can diverge, leading to fluctuations in group strategy choice. Most of the current studies on healthcare services ignore the existence of implicit inertia in seeking medical care due to long-term urban-rural differences (Bywaters et al., 2019). Some studies discussed the influence of patients' socioeconomic background on the choice of healthcare providers (Rees et al., 2022). Studies showed that patients' situational decisions are influenced by the subjective judgments of family members (Chang and Basnyat, 2015), whereas other scholars argued for a relationship between food culture and health perceptions (Lee, 2004). Therefore, there is good reason to infer that the development gap between urban and rural areas brings about different cultures that influence healthcare seeking. In conclusion, stochastic perturbations such as institutional rationality and social culture can influence patients' decisions to seek medical care, and it is not advisable to ignore the long-term role of medical cultures when studying medical problems.

Modeling

Assumptions and parameters

Hypothesis 1: In the process of promoting HDTS, the game subjects are local government health departments, medical institutions, and patients, and all of them are finite and rational. Strategy space for each player can adopt one of the two strategies: to be in favor of HDTS, labeled as cooperators (C), or to not in be favor of HDTS, labeled as defectors (D). The fraction of cooperators in local government health departments, medical institutions, and patients are, respectively, remarked with x, y, z (x, y, $z \in [0,1]$). Accordingly, the fraction of defectors is respectively remarked with 1-x, 1-y, and 1-z.

Hypothesis 2: Health departments in the local government actively support HDTS in two ways. The local health committee organizes professionals to improve the relevant medical regulations and ensures that medical institutions actively participate in the HDTS to maintain a high referral efficiency (Dresser and Frader, 2009) and therefore need to give financial subsidies S to medical institutions. Taking into account that patients adhering to HDTS will often consult primary-level hospitals for medical examination and treatment to prevent diseases from deteriorating, the local medical insurance department needs to increase the reimbursement ratio of primary-level hospitals by θ and $\theta \in (0,1)$ (Kessler et al., 2004). When patients cooperate with the process of primary care and two-way referral, medical resources are allocated more efficiently, creating social benefits B_1. If patients still choose secondary and tertiary hospitals for the first consultation, the medical resources in Grade I hospitals are forced to divert to Grade II and Grade III hospitals, thus the local government health department suffers loss L. Here, we introduce supervision by higher authorities (Dresser and Frader, 2009), such as the National Health Commission and National Health Insurance Administration. If they find out patients do not comply with HDTS and local government health departments do not perform the above functions, the local department will be punished P.

Hypothesis 3: When medical institutions are cooperators in HDTS, a referral form is required and the receiving hospital needs to register temporarily, so the additional cost borne by the whole medical system is C_3 .

When medical institutions are defectors in HDTS, if patients cooperate in HDTS, the pressure on the admission of secondary and tertiary hospitals is appropriately relieved, and the additional cost to be borne by the medical system is C_1; if patients do not cooperate, primary medical resources are not fully utilized, and because there are not enough reservations for registration, temporary referrals will make the operation of the medical system more burdensome, and the additional cost to be borne by the medical system is C_2, i.e., $C_2 > C_1 > C_3$.

Hypothesis 4: When patients are cooperators in HDTS, they choose Grade I hospitals for the first consultation since primary care institutions receive more patients, thus medical resources are tilted to the grassroots. The overall utilization rate of medical resources such as drugs and machinery is increased, and the medical service system gains I_1; when patients are defectors in HDTS, the medical system still gains I_2, i.e., $I_1 > I_2$.

Hypothesis 5: Patients' treatment cost in primary care is E_1 and the average treatment cost in secondary and tertiary hospitals is E_2, so there is $E_1 < E_2$. Patients will first go to primary care institutions when they are cooperators in HDTS. We define the recovery rate after initial treatment in primary care is λ, $\lambda \in (0,1)$; if patients are observed as ones who need an upward referral and the health care system actively implements referral measures such as the adequate provision of reservations for registration, the proportion of patients cost savings is ω, $\omega \in (0,1)$. Patients' health benefit of recovery is B_2 .

Hypothesis 6: The choice of strategy made by the three parties is based on the perceived value of the gain and loss of the strategy rather than the real value of the gain and loss of the strategy, which is consistent with the prospect theory. The perceived value can be measured by the prospect value V, which is jointly determined by the value function $\nu(\Delta\eta_i)$ and the weight function $\pi(p_i)$, as shown by Eq. 1.

$$\begin{cases} V = \sum_i \pi(p_i)\nu(\Delta\eta_i) \\ \nu(\Delta\eta_i) = \begin{cases} (\Delta\eta)^{\alpha} & (\Delta\eta_i \geq 0) \\ -\beta(-\Delta\eta_i)^{\alpha} & (\Delta\eta_i < 0) \end{cases} \end{cases} \quad (1)$$

In Eq. 1, p_i is the probability of occurrence of the event i. The weight function $\pi(p_i)$ has the following characteristics: $\pi(0) = 0$, $\pi(1) = 1$; $\pi(p_i) > p_i$ when p_i is small, $\pi(p_i) < p_i$ when p_i is large. These characteristics indicate that people tend to overestimate low-probability events and underestimate high-probability events, which is consistent with the state of decision-making behavior of finite rational game subjects under uncertainties. $\Delta\eta_i$ is the difference between the game subject's perception of the actual value of the event i and the value of the reference point. Influenced by the situation effect, the choice of the reference point depends on the decision maker's subjective feelings and desired choice. The subject's psychological perception of the decision behavior is gain when $\Delta\eta_i \geq 0$ and loss when $\Delta\eta_i < 0$. The value function $\nu(\Delta\eta_i)$ is characterized by the preference for gain and aversion of loss, which is reflected by the parameters α and β. α is the risk sensitivity coefficient ($0 < \alpha < 1$), which indicates the degree of marginal diminution of the perceived gain and loss value of the game subject. The larger its value, the greater the marginal diminution of the perceived value. β is the loss avoidance factor ($\beta \geq 1$). The higher its value, the greater the sensitivity of the game subject to losses. The sensitivity of the value function at $\Delta\eta_i < 0$ is stronger than that at $\Delta\eta_i > 0$, which means the value curve is steeper in the loss interval than in the gain interval.

According to the prospect theory, there is no deviation between the perceived value and the actual utility of the determining gains and losses. Only when participants are uncertain about gains and losses can psychological perceived utility be generated. In this study, the value of the reference point is set to 0. S, θE_1, and ωE_2 have a value-perception feature, which needs to be represented by the value function: $\nu(S) = -\beta S^{\alpha}$ when health departments provide subsidies and $\nu'(S) = S^{\alpha}$ when medical institutions receive subsidies, $\nu(\theta E_1) = -\beta(\theta E_1)^{\alpha}$ when health departments pay the additional health insurance reimbursement and $\nu'(\theta E_1) = (\theta E_1)^{\alpha}$ when patients benefit from it, and $\nu(\omega E_2) = (\omega E_2)^{\alpha}$ when patients and medical institutions are both cooperators in HDTS. The payoff matrix is constructed and shown in **Table 1** (Bandyopadhyay et al., 2015).

Analysis of evolutionarily stable strategies for replicator dynamic equations

(1) Local government health departments

Local government health departments' expected benefits U_{1C} as cooperators, U_{1D} as defectors, and the average expected benefits U_1 are as follows:

$$\begin{cases} U_{1C} = yz[B_1 + \nu(S) + \nu(\theta E_1)] + y(1-z)[\nu(S) - L] \\ \quad +(1-y)z[B_1 + \nu(\theta E_1)] + (1-y)(1-z)(-L) \\ U_{1D} = yzB_1 + y(1-z)(-L-P) \\ \quad +(1-y)zB_1 + (1-y)(1-z)(-L-P) \\ U_1 = xU_{1C} + (1-x)U_{1D} \end{cases} \quad (2)$$

Therefore, the replicator dynamic equation for local government health departments is

$$F(x) = \frac{dx}{dt} = x(U_{1C} - U_1) = x(1-x)$$
$$[z\nu(\theta E_1) + y\nu(S) + (1-z)P] \quad (3)$$

Taking the first-order derivative of $F(x)$ yields:

$$\frac{d(F(x))}{dx} = (1-2x)[zv(\theta E_1) + yv(S) + (1-z)P] \quad (4)$$

Thus, all levels are in a steady state when $y = -[zv(\theta E_1) + (1-z)P]/v(S) = y^*$, $x^* = 1$ is the evolutionarily stable strategy (ESS) when $y < y^*$, $x^* = 0$ is the ESS when $y > y^*$.

As shown in Figure 1, the volume G_1 represents the probability that the local government health department cooperates in HDTS. The volume G_2 represents the probability that they defect in HDTS. These are calculated as

$$V_{G_1} = \frac{P^2}{2S[P + v(\theta E_1)]}$$

$$V_{G_2} = \frac{2S(P + v(\theta E_1)) - P^2}{2S(P + v(\theta E_1))}$$

Corollary 1: The probability of the local government's health departments cooperating in HDTS decreases with the increase in the probability that medical institutions and patients cooperate with the system; at the same time, it increases with the increase in penalties from higher departments and decreases with the increase in financial subsidies to medical institutions and additional medical insurance reimbursements to primary care institutions.

(2) Medical institutions

Medical institutions' expected benefits U_{2C} as cooperators, U_{2D} as defectors, and the average expected benefits U_2 are

$$\begin{cases} U_{2C} = xz[I_1 - C_3 + v'(S)] + x(1-z)[I_2 - C_3 + v'(S)] \\ \quad +(1-x)z(I_1 - C_3) + (1-x)(1-z)(I_2 - C_3) \\ U_{2D} = xz(I_1 - C_1) + x(1-z)(I_2 - C_2) \\ \quad +(1-x)z(I_1 - C_1) + (1-x)(1-z)(I_2 - C_2) \\ U_2 = yU_{2C} + (1-y)U_{2D} \end{cases} \quad (5)$$

Therefore, the replicator dynamic equation for medical institutions is as follows:

$$F(y) = \frac{dy}{dt} = y(E_{2C} - E_2) = y(1-y)$$
$$[z(C_1 - C_2) + xv'(S) - C_3 + C_2] \quad (6)$$

Taking the first-order derivative of $F(y)$ yields:

$$\frac{d(F(y))}{dy} = (1-2y)[z(C_1 - C_2) + xv'(S) - C_3 + C_2] \quad (7)$$

Thus, all levels are in a steady state when $z = [C_3 - C_2 - xv'(S)]/(C_1 - C_2) = z^*$, $y^* = 0$ is the ESS when $z < z^*$, $y^* = 1$ is the ESS when $z > z^*$.

As shown in Figure 2, the volume of H_1 represents the probability that medical institutions defect in HDTS, and the volume of H_2 represents the probability that they cooperate in HDTS. These are calculated as

$$V_{H_1} = \frac{2(C_3 - C_2) - v'(S)}{2(C_1 - C_2)}$$

$$V_{H_2} = \frac{2(C_1 - C_3) + v'(S)}{2(C_1 - C_2)}$$

Corollary 2: The probability of medical institutions cooperating in HDTS increases with the increase in the probability that the local government health departments and patients cooperate with the system; at the same time, it decreases with the increase of additional costs incurred due to HDTS and increases with the increase of financial subsidies received or costs to be borne if they do not participate in the system.

(3) Patients

TABLE 1 Payoff matrix of the tripartite evolutionary game in the promotion of HDTS.

Strategies			Payoffs		
G	H	P	G	H	P
C	C	C	$B_1 + v(S) + v(\theta E_1)$	$I_1 - C_3 + v'(S)$	$B_2 - E_1 + v'(\theta E_1)$ $-(1-\lambda)E_2 + (1-\lambda)v(\omega E_2)$
C	C	D	$v(S) - L$	$I_2 - C_3 + v'(S)$	$B_2 - E_2$
C	D	C	$B_1 + v(\theta E_1)$	$I_1 - C_1$	$B_2 - E_1 + v'(\theta E_1) - (1-\lambda)E_2$
C	D	D	$-L$	$I_2 - C_2$	$B_2 - E_2$
D	C	C	B_1	$I_1 - C_3$	$B_2 - E_1 - (1-\lambda)E_2$ $+(1-\lambda)v(\omega E_2)$
D	C	D	$-L - P$	$I_2 - C_3$	$B_2 - E_2$
D	D	C	B_1	$I_1 - C_1$	$B_2 - E_1 - (1-\lambda)E_2$
D	D	D	$-L - P$	$I_2 - C_2$	$B_2 - E_2$

G, the local government health departments; H, medical institutions (hospitals); P, patients.

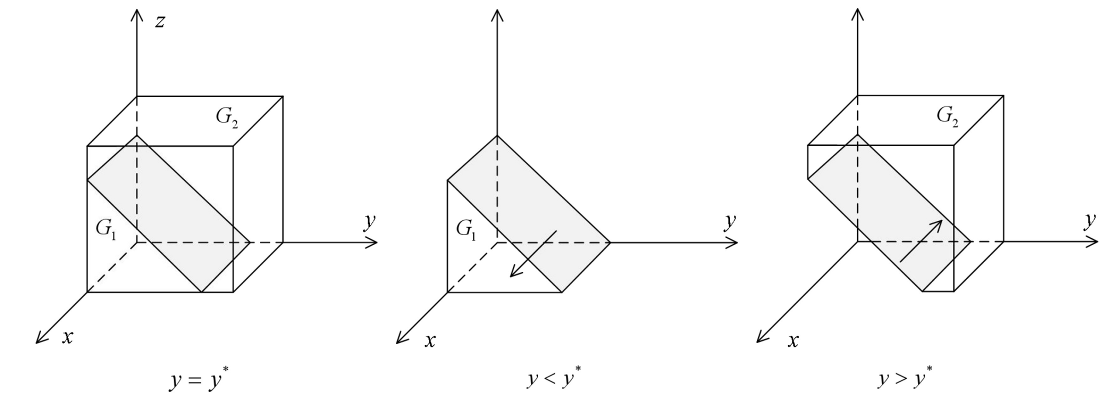

FIGURE 1
Impact of changes in the probability of strategy of medical institutions on the ESS of the local government health departments.

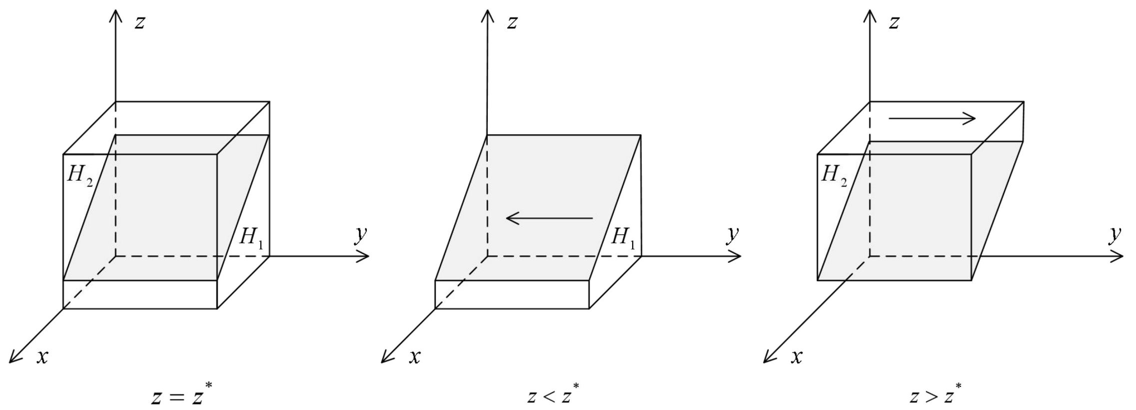

FIGURE 2
Impact of changes in the probability of strategy of patients on the ESS of medical institutions.

Patients' expected benefits U_{3C} as cooperators, U_{3D} as defectors, and the average expected benefits U_3 are

$$\begin{cases} U_{3C} = xy\left[B_2 - E_1 + \nu'(\theta E_1) - (1-\lambda)E_2 + (1-\lambda)\nu(\omega E_2)\right] \\ \quad +x(1-y)\left[B_2 - E_1 + \nu'(\theta E_1) - (1-\lambda)E_2\right] \\ \quad +(1-x)y\left[B_2 - E_1 - (1-\lambda)E_2 + (1-\lambda)\nu(\omega E_2)\right] \\ \quad +(1-x)(1-y)\left[B_2 - E_1 - (1-\lambda)E_2\right] \\ U_{3D} = xy(B_2 - E_2) + x(1-y)(B_2 - E_2) \\ \quad +(1-x)y(B_2 - E_2) + (1-x)(1-y)(B_2 - E_2) \\ U_3 = zU_{3C} + (1-z)U_{3D} \end{cases} \quad (8)$$

Therefore, the replicator dynamic equation for patients is as follows:

$$F(z) = \frac{dz}{dt} = z(U_{3C} - U_3)$$
$$= z(1-z)[y(1-\lambda)\nu(\omega E_2) + x\nu'(\theta E_1) + \lambda E_2 - E_1] \quad (9)$$

Taking the first-order derivative of $F(z)$ yields

$$\frac{d(F(z))}{dz} = (1-2z)[y(1-\lambda)\nu(\omega E_2) + x\nu'(\theta E_1) + \lambda E_2 - E_1] \quad (10)$$

All levels are in a steady state when $x = [E_1 - \lambda E_2 - y(1-\lambda)\nu(\omega E_2)]/\nu'(\theta E_1) = x^*$, $z^* = 0$ is the ESS when $x < x^*$, $z^* = 1$ is the ESS when $x > x^*$.

As shown in **Figure 3**, the volume of P_1 represents the probability that patients defect in HDTS, and the volume of P_2 represents the probability that the patients cooperate in HDTS. These are calculated as

$$V_{P_1} = \frac{2(E_1 - \lambda E_2) - (1-\lambda)\nu(\omega E_2)}{2\nu'(\theta E_1)}$$

$$V_{P_2} = \frac{2\lambda E_2 + (1-\lambda)\nu(\omega E_2) - 2E_1 + 2\nu'(\theta E_1)}{2\nu'(\theta E_1)}$$

Corollary 3: The probability of patients cooperate in HDTS increases with the increase in the probability that the local government health departments and medical institutions cooperate with the system; at the same time, it increases with the increase of the recovery rate after initial treatment in primary care and the proportion of patients cost savings when participating in referrals; if $\alpha = 1$, then it increases with the increase of additional medical insurance reimbursement ratio in primary-level hospitals when the ratio of the cost of treatment in primary care to the average cost of treatment in secondary and tertiary hospitals is greater than a certain value, that is $E_1/E_2 > \lambda + (1-\lambda)\omega/2$.

Equilibrium and stability analysis

From the above discussion, it is clear that the dynamic system of the tripartite game in promoting HDTS is as follows:

$$\begin{cases} F(x) = x(1-x)\left[z\nu(\theta E_1) + y\nu(S) + (1-z)P\right] \\ F(y) = y(1-y)\left[z(C_1 - C_2) + x\nu'(S) - C_3 + C_2\right] \\ F(z) = z(1-z)\left[y(1-\lambda)\nu(\omega E_2) + x\nu'(\theta E_1) + \lambda E_2 - E_1\right] \end{cases} \tag{11}$$

This leads to the pure strategy Nash equilibria of the evolutionary game: $E_1(0,0,0)$, $E_2(1,0,0)$, $E_3(0,1,0)$, $E_4(0,0,1)$, $E_5(1,1,0)$, $E_6(1,0,1)$, $E_7(0,1,1)$, $E_8(1,1,1)$. The Jacobian matrix of the tripartite evolutionary game system is as follows:

$$J = \begin{bmatrix} J_1 & J_2 & J_3 \\ J_4 & J_5 & J_6 \\ J_7 & J_8 & J_9 \end{bmatrix} = \begin{bmatrix} \partial F(x)/\partial x & \partial F(x)/\partial y & \partial F(x)/\partial z \\ \partial F(y)/\partial x & \partial F(y)/\partial y & \partial F(y)/\partial z \\ \partial F(z)/\partial x & \partial F(z)/\partial y & \partial F(z)/\partial z \end{bmatrix}$$

$$= \begin{bmatrix} (1-2x)[z\nu(\theta E_1) + y\nu(S) + (1-z)P] & x(1-x)\nu(S) & x(1-x)[\nu(\theta E_1) - P] \\ y(1-y)\nu'(S) & (1-2y)[z(C_1 - C_2) + x\nu'(\theta E_1) + \lambda E_2 - E_1] & y(1-y)(C_1 - C_2) \\ z(1-z)\nu'(\theta E_1) & z(1-z)(1-\lambda)\nu(\omega E_2) & (1-2z)[y(1-\lambda)\nu(\omega E_2) + x\nu'(S) - C_3 + C_2] \end{bmatrix}$$

From the first method of Lyapunov, let the Jacobian matrix be **A**. If all the eigenvalues of **A** have negative real parts, then the equilibrium is ESS (asymptotic equilibrium); if all the eigenvalues of A contain positive real parts, then the equilibrium is non-stable. The stability analysis of the above eight pure strategy equilibria is thus shown in Table 2.

Corollary 4: The equilibrium is $E_3(0,1,0)$ and the ESS is {D,C,D} when $-\nu(S) > P$, $\lambda E_2 + (1-\lambda)\nu(\omega E_2) - E_1 < 0$.

Under this circumstance, the financial cost borne by local government health departments to support HDTS is greater than the penalty they need to pay if they do not support it, so they tend not to be cooperators; since the burden brought to the whole medical system by defecting HDTS is much greater than the additional cost of cooperating, and the local government health departments deploy subsidies, and medical institutions tend to be cooperators to obtain financial support; patients are more inclined not to cooperate with HDTS but to go directly to secondary and tertiary hospitals due to the lower cure rate of primary care institutions.

Corollary 5: The equilibrium is $E_5(1,1,0)$ and the ESS is {C,C,D} when $-\nu(S) < P$, $(1-\lambda)\nu(\omega E_2) + \nu'(\theta E_1) + \lambda E_2 - E_1 < 0$.

Under this circumstance, the cost for local government health departments to support HDTS is less than the penalty required by higher authorities, so they will tend to be cooperators; medical institutions still tend to cooperate with the referral process to reduce losses because the opportunity cost of not participating in HDTS is too large; patients are still not cooperators because the cure rate in primary care institutions is getting lower.

Corollary 6: The equilibrium is $E_7(0,1,1)$ and the ESS is {D,C,C} when $-(1-\lambda)\nu(\omega E_2) - \lambda E_2 + E_1 < 0$.

Under this circumstance, the recovery rate of patients treated by primary care institutions is significantly higher, so they tend to cooperate in HDTS and are willing to choose primary-level hospitals for the first consultation; both medical institutions and patients becoming cooperators is the goal achieved for local government health departments, for which they can avoid penalties and therefore turn to the strategy of not supporting HDTS.

Simulation of the ESS

To verify the stabilization of the above three equilibria, the simulation of the tripartite evolutionary game process is performed using MATLAB. According to the medical data collected in a province in southern China, the initial values of the parameters are set as follows to verify **Corollary 4**: $S = 60$, $\theta = 0.1$, $B_1 = 100$, $L = 10$, $P = 40$, $C_1 = 6$, $C_2 = 10$, $C_3 = 3$, $I_1 = 60$, $I_2 = 30$, $E_1 = 45$, $E_2 = 70$, $\lambda = 0.3$, $\omega = 0.3$, $B_2 = 100$.

Here, the units of the non-proportional parameters are unified to 100,000; to verify **Corollary 5**, based on the previous parameter given, let $S = 40$ and $P = 80$; to verify **Corollary 6**, based on the previous parameter changes, let $E_1 = 30$. The fitting results are shown in Figure 4.

As can be seen from Figure 4, under the preconditions of **Corollary 4**, **Corollary 5**, and **Corollary 6**, the three sets of values are, respectively, evolved 50 times from different initial strategy combinations, and the strategy combinations of the tripartite evolutionary game of HDTS finally converge to {D,C,D}, {C,C,D}, and {D,C,C}, thus indicating that the

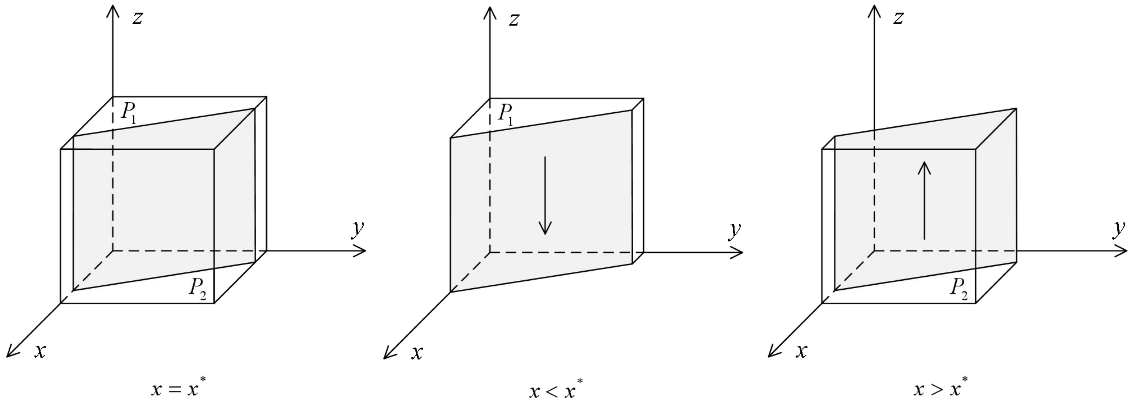

FIGURE 3
Impact of changes in the probability of strategy of local government health departments on the ESS of patients.

TABLE 2 Stability analysis of equilibria based on Jacobian matrix.

Equilibrium	Jacobian matrix eigenvalues		Stability	Con
	$\lambda_1, \lambda_2, \lambda_3$	RPS		
$E_1(0,0,0)$	$P, C_2 - C_3, \lambda E_2 - E_1$	$(+,+,U)$	Non-Stable	\
$E_2(1,0,0)$	$-P, v'(S) + C_2 - C_3, \lambda E_2 - E_1 + v'(\theta E_1)$	$(-,+,U)$	Non-Stable	\
$E_3(0,1,0)$	$v(S) + P, -C_2 + C_3, \lambda E_2 + (1-\lambda)v(\omega E_2) - E_1$	$(U,-,U)$	*ESS*	a
$E_4(0,0,1)$	$v(\theta E_1), C_1 - C_3, -\lambda E_2 + E_1$	$(-,+,U)$	Non-Stable	\
$E_5(1,1,0)$	$-v(S) - P, -v(S) - C_2 + C_3,$ $(1-\lambda)v(\omega E_2) + v'(\theta E_1) + \lambda E_2 - E_1$	$(U,-,U)$	*ESS*	b
$E_6(1,0,1)$	$-v(\theta E_1), S + C_1 - C_3, -\lambda E_2 + E_1 - v'(\theta E_1)$	$(+,+,U)$	Non-Stable	\
$E_7(0,1,1)$	$v(\theta E_1) + v(S), -C_1 + C_3,$ $-(1-\lambda)v(\omega E_2) - \lambda E_2 + E_1$	$(-,-,U)$	*ESS*	c
$E_8(1,1,1)$	$-v(\theta E_1) - v(S), -v'(S) - C_1 + C_3,$ $-(1-\lambda)v(\omega E_2) - v(\theta E_1) - \lambda E_2 + E_1$	$(+,-,U)$	Non-Stable	\

RPS, real part sign; U denotes the uncertainty of whether the real part of the eigenvalue is positive or negative; Con, condition, condition a is $-v(S) > P, \lambda E_2 + (1-\lambda)v(\omega E_2) - E_1 < 0$, condition b is $-v(S) < P, (1-\lambda)v(\omega E_2) + v'(\theta E_1) + \lambda E_2 - E_1 < 0$, condition c is $-(1-\lambda)v(\omega E_2) - \lambda E_2 + E_1 < 0$.

simulation is consistent with the analysis of strategic stability, which has guiding significance for the promotion of HDTS.

Sensitivity analysis of each parameter

To further explore the influence of each parameter on the whole game system, we assumed the initial probability value of 0.2 as cooperators in HDTS for local government health departments, medical institutions, and patients based on the parameter values consistent with **Corollary 6**, which means that the evolutionary stable strategy combination is $E_7(0,1,1)$. The perturbation added to each parameter value is simulated for sensitivity analysis and as a verification of **Corollary 1**, **Corollary 2**, and **Corollary 3**.

As shown in **Figure 5A**, the increase in financial subsidies to medical institutions by local government health departments can accelerate the evolution of medical institutions' active participation in HDTS and also make health departments evolve from cooperators to defectors more quickly. As S increases, the probability of medical institutions cooperating with the system increases due to the fact that the increase of subsidies has a greater incentive for them, while the probability of health departments being cooperators decreases due to the increase in financial costs as a result of increased subsidies.

As shown in **Figure 5B**, increasing penalties P can increase the upper limit of the probability of local government health departments being cooperators, which will lead to a longer period of maintaining a high probability of supporting HDTS, and the moment when the probability starts to decline is correspondingly delayed. However, this probability will eventually converge to 0. This is because the social benefits brought by defecting HDTS are not enough to

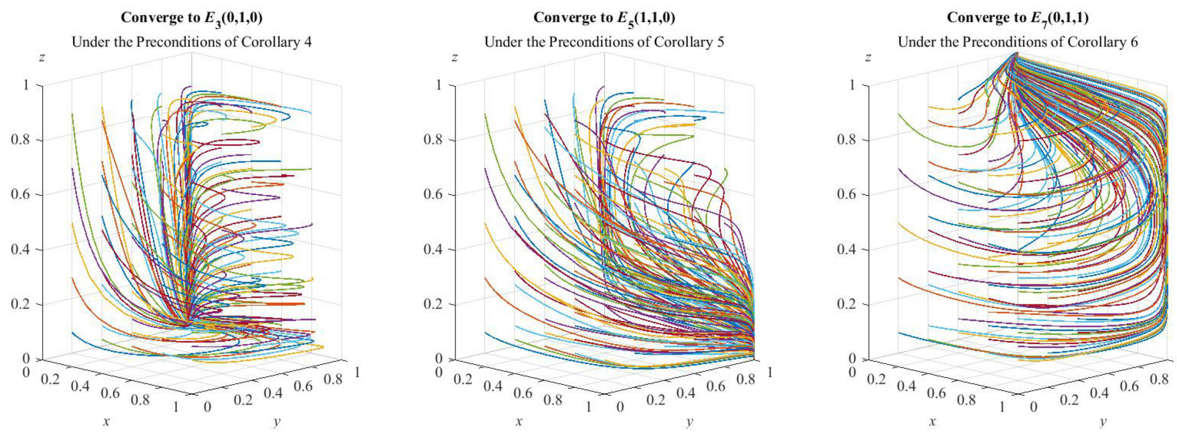

FIGURE 4
Simulation verification of the ESS.

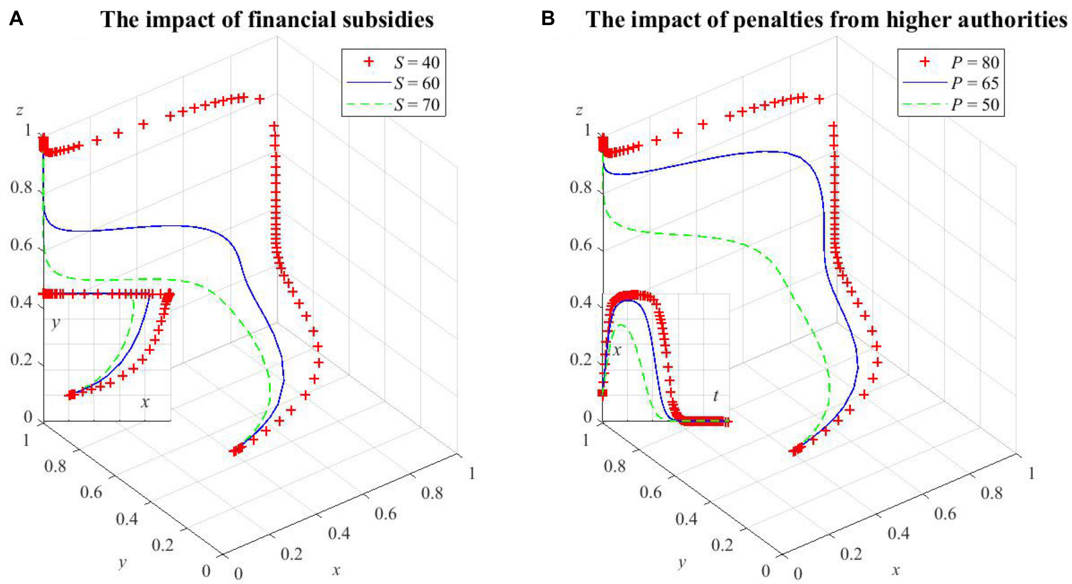

FIGURE 5
The impact of factors on local government health departments' decision making. **(A)** The impact of financial subsidies on health departments' decision making, **(B)** the impact of penalties from higher authorities on health departments' decision making.

compensate for the losses caused by the increase in penalties. As a result, they tend to be cooperators at this point. After the convergence to the equilibrium, medical institutions and patients actively participate in HDTS. The additional social benefits will increase and the local government health departments will not be punished by higher authorities, so the probability of health departments being cooperators will gradually decrease.

As shown in Figure 6A, the probability of medical institutions cooperating in HDTS decreases and convergence slows as the additional cost of cooperating in HDTS increases. However, when the whole medical system actively participates in the referral process, the operational efficiency increases, and the benefits are much greater than the additional cost of participating in HDTS, so medical institutions will still evolve to being cooperators.

As shown in Figure 6B, the increase in the additional cost of defecting in HDTS will increase the probability of medical institutions cooperating in HDTS. This is because, in this situation, they need to bear the extra cost caused by the low efficiency of medical resource utilization and also cannot obtain government subsidies and extra benefits from participating in HDTS, so the increase of various opportunity costs will motivate medical institutions to be cooperators.

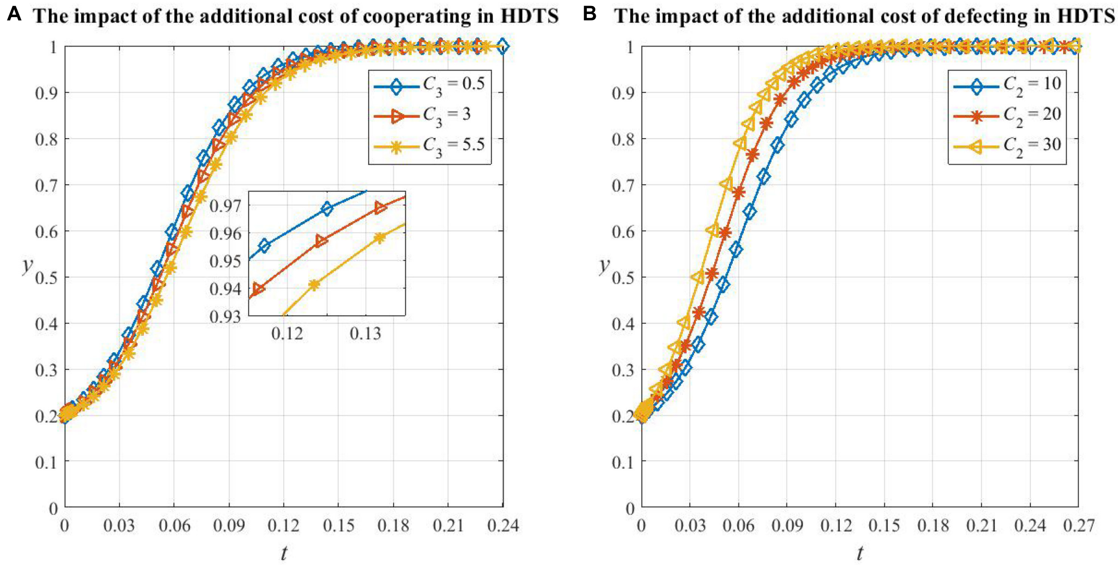

FIGURE 6
The impact of factors on medical institutions' decision making. **(A)** The impact of the additional cost of cooperating in HDTS on medical institutions' decision making, **(B)** the impact of the additional cost of defecting in HDTS on medical institutions' decision making.

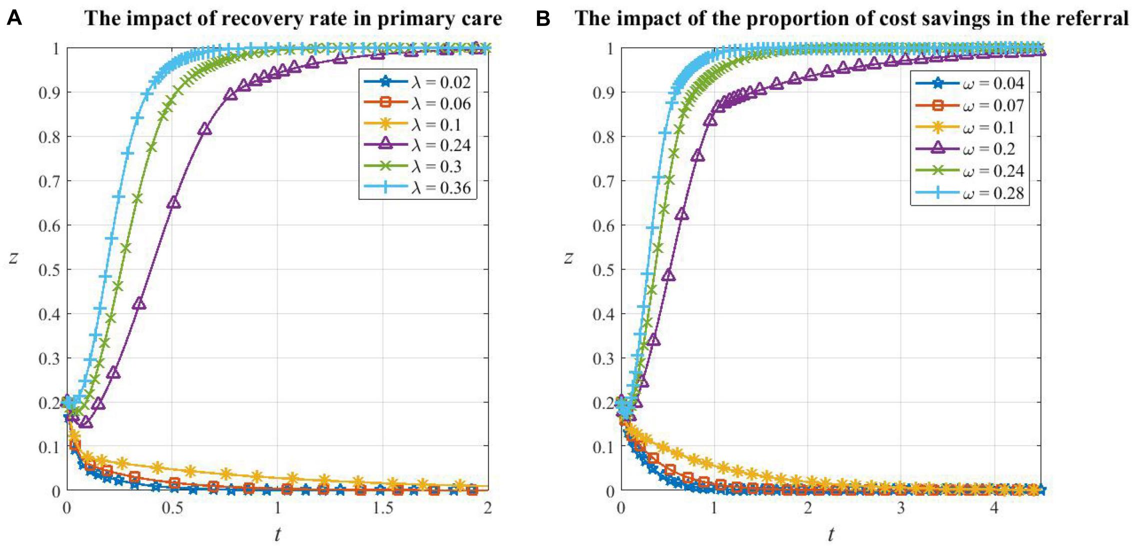

FIGURE 7
The impact of factors on patients' decision making. **(A)** The impact of recovery rate in primary care on patients' decision making, **(B)** the impact of the proportion of cost savings in the referral on patients' decision making.

From Figures 7A, B, it can be seen that the critical values of recovery rate λ and cost saving ratio ω are between the range 0.1 to 0.24 and 0.1 to 0.2, respectively. When the two parameters are less than their critical values, patients will evolve in the direction of not cooperating in HDTS, and the smaller the parameter value, the smaller the probability of cooperating and the faster it will converge to 0. In this situation, the system has already undergone large changes and the convergence point degenerates to $E_5(1,1,0)$ in **Corollary 5**. This is because if the cure rate of primary care is too low and the patient's condition has a higher risk of deterioration, which increases the potential medical expense, then the patient will be more willing to consult secondary or tertiary hospitals which are equipped with better medical resources; if the savings, when the patient participates in the referral, are too small to compensate for the opportunity cost brought by cooperating in HDTS, then the patient will also choose a higher-level hospital. Meanwhile, we found that the convergence speed of patients' strategy evolution when λ is changed is greater than that when ω is changed, which indicates that the recovery rate is a more important factor in patients' strategy choice than the treatment cost.

From **Figures 8A, B**, we can see that the increase in the additional reimbursement rate of primary care θ will accelerate the evolution of local government health departments from active support to inactive support and also the evolution of patients' cooperation in HDTS. With the increase θ, the probability of health departments choosing to support HDTS increases at about the same rate, but the phase to maintain the high probability is shortened and soon enters the decreasing stage. This is because the increase in the health insurance reimbursement rate in primary care makes patients more willing to cooperate in HDTS, which can bring social benefits and allow the system to converge to equilibrium quickly. Then, the local government health departments will ease up on the support of HDTS due to the need for financial expenditure reduction and the fact that they will not be punished by higher authorities since the aim of HDTS is achieved.

The effect of psychological perceived value on the system

It is measured that when $\alpha = 0.88$ and $\beta = 2.25$, the value function can represent the approximate behavioral preferences of any decision-maker (Li et al., 2022). We can rewrite the replicator dynamic equations in Eq. 11 as ones with α and β.

$$\begin{cases} F(x) = x(1-x)\left[-z\beta(\theta E_1)^{\alpha} - y\beta S^{\alpha} + (1-z)P\right] \\ F(y) = y(1-y)\left[z(C_1 - C_2) + xS^{\alpha} - C_3 + C_2\right] \\ F(z) = z(1-z)\left[y(1-\lambda)(\omega E_2)^{\alpha} + x(\theta E_1)^{\alpha} + \lambda E_2 - E_1\right] \end{cases} \tag{12}$$

To investigate the effect of the risk sensitivity coefficient α and the loss avoidance factor β on the system evolution, the values of 0.5, 0.7, 0.88, and 1 are taken for α and 1, 1.5, 2.25, and 3 for β, respectively. The game system is still based on the parameter values consistent with **Corollary 6,** and let the initial values of x, y, and z all be 0.2. With these preconditions, the sensitivity of the strategy choice of each participant to α and β is simulated as follows.

(1) Sensitivity analysis of game subjects to α

From **Figure 9A**, it can be seen that the game system is very sensitive to the risk sensitivity coefficient α, and changes in α cause the equilibrium of the system to change. When $\alpha = 0.5$ and 0.7, the system evolves toward the strategy combination {C,C,D} and eventually stabilizes, and the smaller the value α, the faster it evolves; when $\alpha = 0.88$ and 1, the system evolves toward the strategy combination {D,C,C} and eventually stabilizes, and the larger the value of α, the faster it evolves.

As can be seen from **Figures 9B–D**, when $\alpha = 0.5$ and 0.7, which means the level of the risk sensitivity coefficient is low, the perception of health departments' subsidies $\nu(S)$ and additional reimbursement $\nu(\theta E_1)$ is faint. They perceive the cost of supporting HDTS to be small and therefore evolve toward being cooperators. Medical institutions have little perception of the subsidies $\nu'(S)$ received, and the incentive effect of subsidies is not great, so the evolution to cooperate in HDTS is slowed down. Patients' perception of additional reimbursement $\nu'(\theta E_1)$ and referral savings $\nu(\omega E_2)$ is small, so they do not perceive significant benefits from participating in the system, so they will evolve in the direction of being defectors.

When α exceeds a certain threshold (0.5–0.88), which means that the risk sensitivity coefficient is at a high level, for example, α increases from 0.88 to 1, the degree of increase in the probability of them being cooperators and the duration of maintaining the high probability decreases sharply, leading to the acceleration of the evolution of finally inactive support. This is because health departments are more inclined to reduce the support as soon as possible because of the perceived increased cost of promoting HDTS, while medical institutions and patients are more inclined to support it because the perceived benefits are more significant.

Overall, the evolutionary tendency of the game system toward the optimal strategy combination {D,C,C} will strengthen as α increases, but α being too large also makes the willingness of health departments to support HDTS drop significantly, and therefore, the dividend period of support provided for medical institutions and patients becomes shorter.

(2) Sensitivity analysis of game subjects to β

From **Figure 10A**, the game system is sensitive to the loss avoidance factor β. However, changes in β do not change the equilibrium of the system, and they only have an impact on the speed of convergence. The system evolves toward and eventually stabilizes at the strategy combination {D,C,C} no matter what level β is on, and the larger the value β, the slower the system converges.

As shown in **Figures 10B–D**, the higher the value β, the faster the health department evolves from cooperating in HDTS to not supporting it; the speed of medical institutions evolving to be cooperators decreases, but the magnitude is very small; the speed of patients evolving to cooperate becomes very slow, which is the determinant of the slow convergence of the system. This is because, as β increases, health departments become more aware of their loss when supporting HDTS, which strengthens the tendency of them to be defectors and prematurely stop providing additional reimbursements to patients who consult primary care institutions. At the same time, the motivation of patients to cooperate depends mostly on the recovery rate in primary care institutions and the perceived benefits of cost savings when participating in referrals. The improvement of these two factors requires higher medical standards and higher operational efficiency of the health care system, which will take

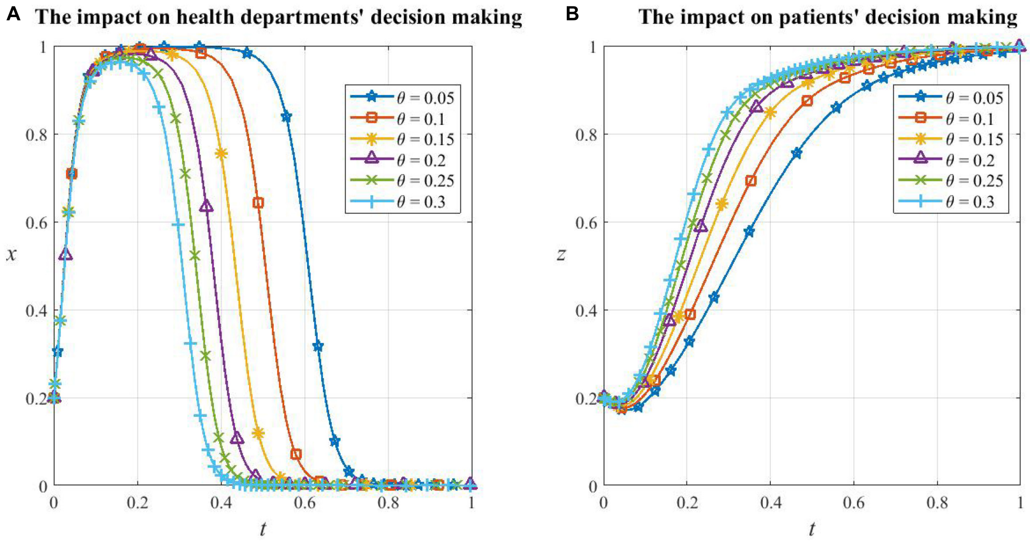

FIGURE 8
The impact of additional health insurance reimbursement rate. **(A)** The impact of additional health insurance reimbursement rate on local government health departments' decision making, **(B)** the impact of additional health insurance reimbursement rate on patients' decision making.

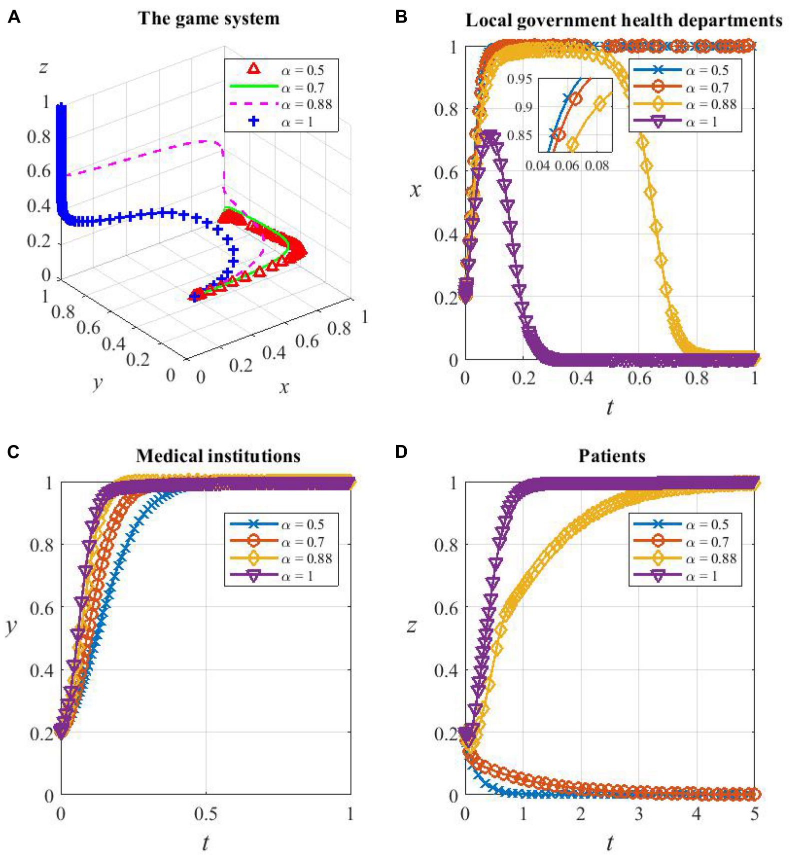

FIGURE 9
The game subjects' sensitivity to α. **(A)** The whole game system's sensitivity to α, **(B)** local government health departments' sensitivity to α, **(C)** medical institutions' sensitivity to α, and **(D)** patients' sensitivity to α.

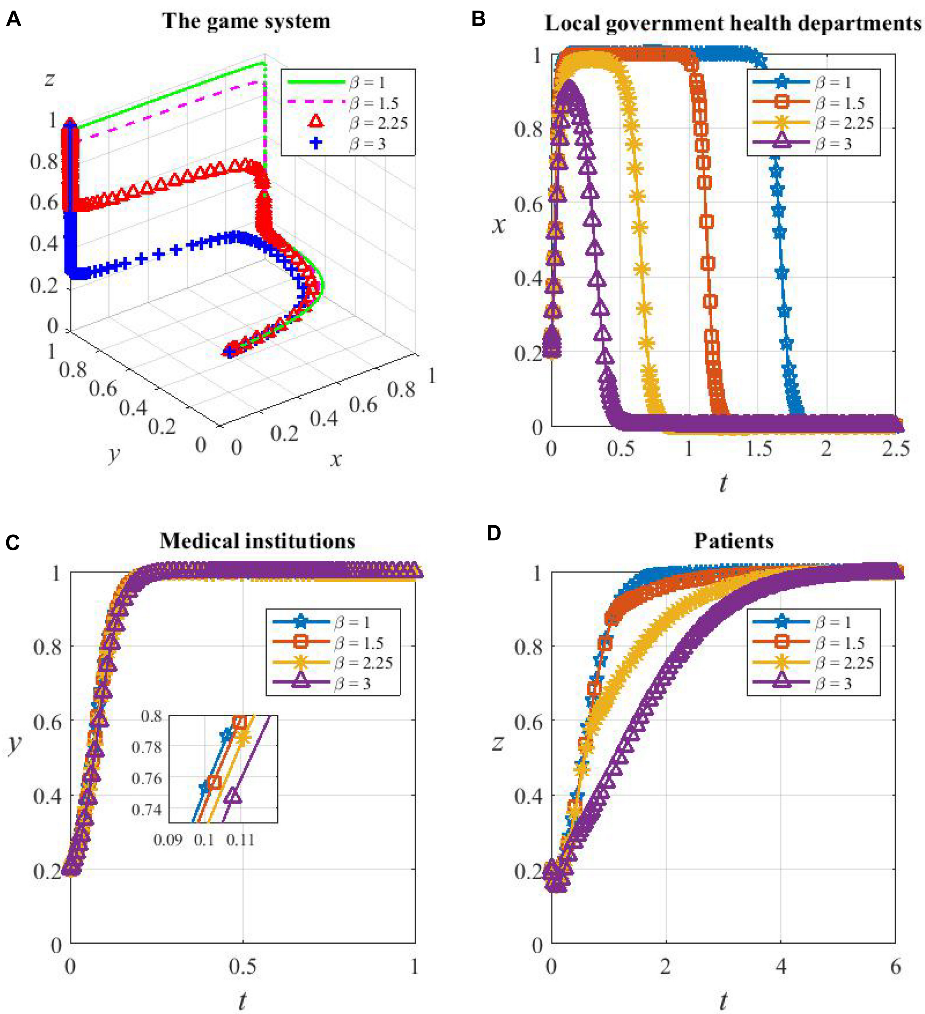

FIGURE 10
(A) The game subjects' sensitivity to β. The whole game system's sensitivity to β, **(B)** local government health departments' sensitivity to β, **(C)** medical institutions' sensitivity to β, and **(D)** patients' sensitivity to β.

a long time to achieve in reality, and therefore, the probability of patients' cooperation in HDTS converges to one more slowly.

Overall, as β increases, the game system evolves more slowly toward the optimal strategy combination {D,C,C}. The sensitivity of patients with β is mainly influenced by local government health departments and medical institutions.

Further discussion

Reasons for using stochastic evolutionary game model

In our process of establishing the above model, the introduction of prospect theory shows the internal influence of psychological factors on HDTS (Linder et al., 2021), which only reflects the limited rationality of subjects inside this game system. In reality, the uncertainty of external factors also has a significant impact on the implementation of HDTS (Sun and Gu, 2022). Specifically, changes in the operating environment of the medical system, unexpected personal situations of patients, and interference from other external factors are stochastic; therefore, consideration of stochastic factors can improve the accuracy of models (Wang et al., 2022). Based on this, some scholars regard the strategy evolution process as a random jump between multiple states and use the traditional game to construct a stochastic game model, but complete rationality becomes the biggest constraint (Rand et al., 2013). To improve the validity of the model, this study draws on the concept of Gaussian white noise to construct a stochastic evolutionary game model under asymmetric conditions for describing the real-time stochastic dynamic evolutionary process of the promotion of HDTS. The Itô stochastic differential equation of the three-party game is solved numerically, and the stability analysis of the strategy selection states of the three parties is carried out according to the stability discriminant theorem of the stochastic differential equation.

Stochastic evolutionary game modeling

To facilitate the study of the influence of external interference on the decision of three parties, we assume $\alpha = \beta = 1$. It is important to note that the fraction of defectors in local government health departments is remarked with x, while the fraction of cooperators is $1 - x$. The same goes for medical institutions and patients. Since $x, y, z \in [0,1]$, $1 - x$, $1 - y$, $1 - z$ are non-negative and have no effect on the final strategy choice, so the previous replicator dynamic equations are modified as follows:

$$\begin{cases} dx(t) = [-(P + \theta E_1)z - yS + \theta E_1 + S]x(t)dt \\ dy(t) = [(C_1 - C_2)z + Sx - C_1 + C_3 - S]y(t)dt \\ dz(t) = [(1 - \lambda)\omega E_2 y + \theta E_1 x - (1 - \lambda)\omega E_2 \\ -\lambda E_2 + (1 - \theta)E_1]z(t)dt \end{cases} \tag{13}$$

Hence, by drawing on the concept of Gaussian white noise, the stochastic differential equation is used to describe the various types of random disturbance existing in the game system, and the stochastic replicator dynamic differential equation for each participant can be obtained as follows:

$$\begin{cases} dx(t) = [-(P + \theta E_1)z - yS + \theta E_1 + S]x(t)dt \\ +\delta\sqrt{(1 - x(t))x(t)}d\omega(t) \\ dy(t) = [(C_1 - C_2)z + Sx - C_1 + C_3 - S]y(t)dt \\ +\delta\sqrt{(1 - y(t))y(t)}d\omega(t) \\ dz(t) = [(1 - \lambda)\omega E_2 y + \theta E_1 x - (1 - \lambda)\omega E_2 - \lambda E_2 \\ +(1 - \theta)E_1]z(t)dt + \delta\sqrt{(1 - z(t))z(t)}d\omega(t) \end{cases} \tag{14}$$

$\omega(t)$ is the standard one-dimensional Brownian motion process with increments $\Delta\omega(t) = \omega(t + h) - \omega(t)$ obeying the normal distribution $N(0, \sqrt{h})$, and the meaning of the second half of the stochastic differential equation is illustrated using the first equation in Eq. 14 as an example:

1. Many perturbations are affecting the tripartite participation in HDTS, both internal and external, and each factor does not play a decisive role, which illustrates the significance of normal distribution.
2. $\delta\sqrt{(1 - x(t))x(t)}d\omega(t)$ is the stochastic disturbance, and $(1 - x(t))x(t)$ reaches its maximum only at $1 - x(t) = x(t)$, which is in line with the actual situation where the probability of two decisions differs greatly and people tend to choose the strategy with the higher probability due to the herd mentality. If the two probabilities differ little, people often waver and the decision is easily disturbed by external factors.
3. δ indicates the intensity coefficient of stochastic disturbance, and the coefficient size is related to the medical culture. In urban areas, HDTS is less likely to be obstructed, since there exists less interference intensity in various aspects because of the well-constructed medical environment, adequate policy propaganda, high quality of the medical population, strong willingness to cooperate, and more participation in unit medical checkups (Peen et al., 2010). In rural areas, the lack of medical resources, the difficulty of seeking medical treatment, the severe aging of the rural population, the recurrence of epidemics in recent years, and the tendency to avoid medical treatment due to economic level and traditional concepts all have caused greater interference in the implementation of HDTS (Parks et al., 2003). In summary, the urbanization level is inversely correlated with the intensity coefficient of stochastic disturbance.

Stability analysis of the equilibrium solution

The Itô stochastic differential equation is expressed as

$$dx(t) = f(t, x(t))dt + g(t, x(t))d\omega(t) \tag{15}$$

According to the stability discriminant theorem for stochastic differential equations (Ajmone Marsan et al., 2016), there exists a positive, continuous function $V(t, x)$ with positive constants c_1, c_2, such that $c_1 |x|^p \leq V(t, x) \leq c_2 |x|^p, t \geq 0$.

1. If there exists a positive constant γ, such that $LV(t, x) \leq -\gamma V(t, x),\ t \geq 0$, then it implies that the global exponential stability in pth mean of Eq. 15 and $E|x(t, x_0)|^p \leq (c_2/c_1)|x_0|^p e^{-\gamma t}, t \geq 0$.
2. If there exists a positive constant γ, such that $LV(t, x) \geq \gamma V(t, x),\ t \geq 0$, then it implies the global exponential instability in pth mean of Eq. 15 and $E|x(t, x_0)|^p \geq (c_2/c_1)|x_0|^p e^{-\gamma t}, t \geq 0$.

For Eq. 14, Suppose that $V_t(t, x) = x$, $V_t(t, y) = y$, $V_t(t, z) = z, c_1 = c_2 = 1, p = 1, \gamma = 1$, we obtain:

$$\begin{cases} LV(t, x) = f(t, x) = x[-(P + \theta E_1)z - yS + \theta E_1 + S] \\ LV(t, y) = f(t, y) = y[(C_1 - C_2)z + Sx - C_1 + C_3 - S] \\ LV(t, z) = f(t, z) = z[(1 - \lambda)\omega E_2 y + \theta E_1 x \\ -(1 - \lambda)\omega E_2 - \lambda E_2 + (1 - \theta)E_1] \end{cases} \tag{16}$$

Therefore, if there is the zero-solution exponential stability of Eq. 16, then

$$\begin{cases} x[-(P+\theta E_1)z - yS + \theta E_1 + S] \le -x \\ y[(C_1 - C_2)z + Sx - C_1 + C_3 - S] \le -y \\ z[(1-\lambda)\omega E_2 y + \theta E_1 x - (1-\lambda)\omega E_2 - \lambda E_2 \\ +(1-\theta)E_1] \le -z \end{cases} \tag{17}$$

Accordingly, if there is the zero-solution exponential instability of Eq. 16, then:

$$\begin{cases} x[-(P+\theta E_1)z - yS + \theta E_1 + S] \ge x \\ y[(C_1 - C_2)z + Sx - C_1 + C_3 - S] \ge y \\ z[(1-\lambda)\omega E_2 y + \theta E_1 x - (1-\lambda)\omega E_2 - \lambda E_2 \\ +(1-\theta)E_1] \ge z \end{cases} \tag{18}$$

Numerical solution of stochastic differential equations

Since the non-linear Itô stochastic differential equation cannot be solved analytically, we used the Stochastic Taylor Expansion and the Itô differential formulation method for the stochastic numerical approximation. For Eq. 15, let $t \in [t_0, T]$, $x(t_0) = x_0$, $x_0 \in R$. $d\omega(t)$ obeys the normal distribution$N(0, \Delta t)$. Let $h = (T - t_0)/N$, $t_n = t_0 + nh$, $t_0 < t_1 < \ldots < t_n < \ldots < t_N = T$. We can find the numeric solution for stochastic differential equations using the explicit Milstein method of Eq. 19 as follows (Gobet et al., 2005):

$$\begin{aligned} x(t_{n+1}) &= x(t_n) + h_n f(x(t_n)) + \Delta\omega_n g(x(t_n)) \\ &+ \frac{1}{2}[(\Delta\omega_n)^2 - h_n] g(x(t_n)) g'(x(t_n)) \end{aligned} \tag{19}$$

In Eq. 19, the step size is $h_n = t_{n+1} - t_n$, $\Delta\omega_n = \omega(t_{n+1}) - \omega(t_n) \sim N(0, h_n)$, $\omega(t_0) = 0$.

The form of numeric solutions can be obtained according to the above expanding method for Eq. 14:

$$\begin{cases} x(t_{n+1}) = x(t_n) + h_n[-(P+\theta E_1)z(t_n) - Sy(t_n) + \theta E_1 + S] \\ \quad + \Delta\omega_n \delta\sqrt{(1-x(t_n))x(t_n)} + \frac{1}{4}\delta^2[(\Delta\omega_n)^2 - h_n] \\ (1 - 2x(t_n)) \\ y(t_{n+1}) = y(t_n) + h_n[(C_1 - C_2)z(t_n) + Sx(t_n) - C_1 \\ + C_3 - S] \\ \quad + \Delta\omega_n \delta\sqrt{(1-y(t_n))y(t_n)} + \frac{1}{4}\delta^2[(\Delta\omega_n)^2 - h_n] \\ (1 - 2y(t_n)) \\ z(t_{n+1}) = z(t_n) + h_n[(1-\lambda)\omega E_2 y(t_n) + \theta E_1 x(t_n) \\ -(1-\lambda)\omega E_2 - \lambda E_2 + (1-\theta)E_1] \\ \quad + \Delta\omega_n \delta\sqrt{(1-z(t_n))z(t_n)} + \frac{1}{4}\delta^2[(\Delta\omega_n)^2 - h_n] \\ (1 - 2z(t_n)) \end{cases} \tag{20}$$

Impact of medical cultures on the game system

In the simulation, the step size $h_n = 0.001$. The initial state is assumed as $x(0) = y(0) = z(0) = 0.5$ and the parameter values are consistent with **Corollary 6**, that is, consistent with the equilibrium {D,C,C}. It can be confirmed theoretically that, with the given parameter values, the proportion of defectors in medical institutions and patients has zero-solution exponential stability (Eq. 17) and the proportion of defectors in health departments does not (Eq. 18).

The Milstein method (Eq. 20) is used for numerical simulation, and the values of 1.5, 3, and 5 are taken for the intensity coefficient of stochastic disturbance δ. From the previous analysis, it is known that the larger value represents the lower degree of urbanization, and the above three values can represent the degree of disturbance in the promotion of HDTS under the medical cultures of urban, town, and rural, respectively.

As can be seen from **Figure 11**, the evolution process shows a certain volatility, indicating that the system evolution is disturbed by stochastic factors. Different intensity coefficients of stochastic disturbance have different effects on the evolution rate of the game system. The strategy evolution of the local government health departments is the most sensitive to the perturbation changes. The inadequate construction of the rural healthcare environment motivates the local health departments to actively support HDTS for a longer time and converge to the non-zero solution for a longer time compared with urban and town areas.

The strategy evolution of medical institutions is the least sensitive to the perturbation changes, and the rate of convergence to the zero solution is roughly the same for all medical cultures. This is related to the higher opportunity cost of being defectors in HDTS.

The strategy evolution of patients is moderately sensitive to the perturbation changes, and the number of simulations required for patients' strategies to converge to the cooperation state is less in rural areas than in urban areas, that is, patients in rural areas are more willing to cooperate in HDTS. This is because, in the evolutionary game model constructed above, the interference of health departments has become an important factor that affects the cooperation of patients. The purpose of HDTS is to make patients comply with the rules of the first consultancy in primary care and orderly referral. Therefore, the unstable medical environment in rural areas requires continuous follow-up of the subsidy policy of health departments and creates adequate benefits for rural patients so that they show active cooperation with the system. It is also clear from **Figure 11** that the more the support of HDTS of health departments under the rural medical culture, the more quickly rural patients will become cooperators.

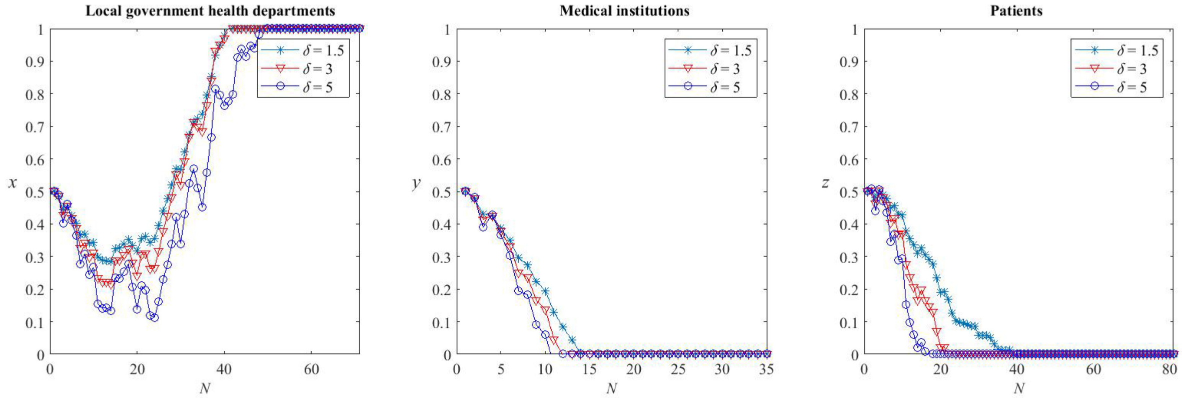

FIGURE 11
Stochastic evolution of strategies under different medical cultures.

Conclusion and recommendations

Conclusion

This study analyzes the evolutionary game among local government health departments, medical institutions, and patients in the context of promoting the HDTS and planning the layout of medical resources, our research found the following:

The probability of local government health departments cooperating in HDTS is negatively correlated with the number of subsidies and additional medical insurance reimbursement for patients, positively correlated with penalties from higher-level authorities, and negatively correlated with the probability of the other two parties being cooperators.

The probability of medical institutions cooperating in HDTS is positively correlated with the subsidies received and the costs borne by being defectors in the system, negatively correlated with the additional costs borne by being cooperators in HDTS, and positively correlated with the probability of the other two parties being cooperators.

The probability of patients cooperating in HDTS is positively correlated with the recovery rate of treatment in primary medical institutions, the additional reimbursement received, and the proportion of cost savings when participating in referrals and positively correlated with the probability of the other two parties being cooperators.

Changes in the risk sensitivity coefficient α alter the equilibrium of the tripartite game system. When α is below a certain threshold (0.7-0.88), the strategic combination of the tripartite game evolves to {C,C,D}. When α is above this threshold, the strategy combination evolves to {D,C,C}. In addition, when α is at a high level, local government health departments perceive that the cost of supporting HDTS increases, so they are inclined to be defectors. However, medical institutions and patients tend to cooperators due to the perceived increase in benefits.

Changes in the loss avoidance factor β do not alter the equilibrium but have a significant impact on the speed of convergence. As β increases, the evolution of the strategy of local government health departments, from a high probability of support of HDTS to eventual non-support, becomes faster; the evolution of medical institutions toward participation in HDTS mildly decreases; the evolution of patients toward cooperation with HDTS slows down significantly. This is because the increase in the loss aversion makes the financial subsidies and additional reimbursement given by local government health departments reduce, which will slow down the speed of improvement in primary care institutions on the one hand, and decrease the recovery rate in primary care and the benefits patients acquire in referral on the other hand.

Different intensity coefficients of stochastic disturbance δ have different effects on the speed of evolution of each game subject in HDTS. Compared with medical cultures in areas with a higher degree of urbanization, the health departments under rural medical culture support HDTS for a longer time. Meanwhile, with the government's intervention, rural patients are more motivated to cooperate in HDTS, and the system will converge to equilibrium faster.

Recommendations

Local government health departments need to actively play a regulatory role in the medical services market. First, the local health commission can control the financial support by keeping it within certain limits. While increasing financial input, improving the efficiency of healthcare financial expenditures and avoiding financial waste are also important. Second, local health insurance departments can use health insurance reimbursement policies to play a leveraging role in the formation of a rational order for residents to seek medical treatment. By adjusting health insurance reimbursement ratios, the gap between the reimbursement ratios of medical expenses can be appropriately widened when residents choose different levels of medical institutions for their first consultation. In this way, the government health departments can provide effective guidance for patients in the rural medical culture. At the same time, reasonably set the prices for different levels of hospital visits in the referral system. This will encourage residents to form the habit of seeking medical treatment in community-level institutions for minor illnesses and in the Grade III hospitals for major illnesses, thus promoting the efficient operation of the medical system, and improve the service capacity, treatment level, and equipment configuration of primary care institutions by injecting more resources and letting the treatment quality of primary care hospitals be the same as the secondary and tertiary hospitals, thus improving patients' satisfaction. Finally, by increasing the publicity of HDTS, we can strengthen the popularization and guidance of the policy so as to improve the residents' willingness to seek primary care and gradually form a scientific and reasonable order of the medical system. In addition, the National Health Care Commission and the National Health Insurance Bureau are supposed to inspect the local medical environment regularly, strengthen the refined supervision of health insurance funds, promote the standardized use of medical insurance funds by relying on information technology, resolutely prevent insurance frauds from disrupting the medical service market, and create a new regulatory pattern of "health insurance plus credit".

As providers of medical and health services, medical institutions at all levels should, first of all, take effective measures to improve patients' sense of fulfillment and trust by improving the level of treatment, service quality, and referral efficiency. It is also advisable to enhance the internal operation governance of medical associations, smooth referral channels, and promote technology sharing among all hospitals. Second, they should clearly define their functional positioning and business division to form a medical service network without conflict of interest and horizontal competition and ensure two-way treatment without barriers. Grade III hospitals should focus on the leading role in medical science, technological innovation, and talent training, gradually reduce the pressure caused by general outpatient clinics with clear diagnoses and stable conditions, and divert patients with chronic diseases. Primary medical institutions should pay more attention to refining internal management processes, improving service capabilities, and creating a comfortable medical environment so as to attract more patients to choose primary care. Finally, the rights and obligations of medical institutions at all levels and the criteria for referrals should be clearly defined, leading to a more convenient referral process for patients to take part in.

Patients, as the demand side of medical services, first, should establish awareness of keeping in good health and have a basic understanding of the disease spectrum, as well as knowledge of the types and prevention measures of common and frequently-occurring diseases, which is of great significance to build a more effective and scientific medical culture. Second, they should change the notion of seeking medical treatment in high-level hospitals for every disease and be confident in the precise management of government health departments and the standardized treatment of medical institutions, especially primary medical institutions. Finally, they should also take the initiative to understand the health policies such as medical insurance reimbursement and referral rules and then actively participate in the process of promoting HDTS in an orderly manner.

Limitations and future directions

This study explores the decision-making process of the three parties involved in the promotion of the diagnosis and treatment system, which can provide insights for further improvement. Inevitably, there are some limitations to be solved. First, the data and parameter values used in the simulation may not fit the real situation well and can only give the optimal explanation within a certain range. Second, the promotion of the hierarchical medical system also involves the participation of pharmaceutical manufacturing companies, and our study only analyzes the problem from a macroscopic perspective. This could be considered in the follow-up research.

Data availability statement

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

CT contributed to the model building as well as the manuscript writing. XC contributed to the analysis of the results and made multiple revisions for the final publication. WZ and ZZ supported the total work of CT and contributed to the empirical analysis and text writing. RT, RD, and QX contributed to the overall quality of literature organization and manuscript revision. All authors discussed the conclusions and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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COVID-19 online teaching intervention and learning performance of college foreign language students

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This quasi-natural experimental study examined an online teaching intervention implemented in response to COVID-19 in China in 2020. It applied the difference-in-difference model to examine the impact and path of the intervention on students' learning performance of a college foreign language (LPCFL). Based on data from records of withdrawing and changing courses, classroom learning, and teaching evaluations; a questionnaire survey of teachers and students; and relevant school documents during the last seven terms, the results indicated that the online teaching intervention could significantly improve students' LPCFL. This finding remained robust after adopting a placebo test approach to mitigate possible endogeneity issues. Additionally, this study also conducted a group test through sub-sample regression based on students' discipline characteristics and intervention organization methods. The results showed that the students who participated in the intervention significantly improved in the three disciplines: humanities was most significantly affected, science and engineering were least significantly affected, and economics and management were in the middle. A range effect was observed for organizational methods. The two downward transmission methods by college teaching management terms had significant positive effects, whereas the other two methods of downward transmission by college student management had significant negative effects. An analysis of the action mechanism indicated that the online teaching intervention mostly improved LPCFL through two channels: students' learning input and learning support. Overall, these findings not only help expand the research framework on macro environmental intervention policy and micro-learning behavior but also have implications for the in-depth understanding of the real learning effect of online learning interventions for college students and their design in the post-COVID-19 era.

KEYWORDS

COVID-19, online teaching intervention, learning performance of college foreign language, DID (difference-in-difference) model, quasi-natural experiment

1. Introduction

In 2020, the COVID-19 outbreak spread globally, and students' learning was affected in various countries. This situation promoted the comprehensive transition from traditional to online teaching modes through mandatory institutional change. Previously an exploratory option, online teaching became the only method available, and the physical classroom was transferred to cloud-based live broadcasts. Thus, teachers were required to adjust their traditional teaching designs, while students needed to adapt to new classroom participation methods to cope with the impact of COVID-19 on normal college operations (Bao et al., 2021). Since the 1990s, extensive access to the Internet has greatly promoted the development of online education (Abouhashem et al., 2021). Here, massive open online courses, in particular, experienced explosive growth after 2013. Before the COVID-19 outbreak, a wide range of learners already benefited from online teaching, and large-scale online teaching gradually became a good supplement to traditional face-to-face methods. However, in universities, especially first-class universities, online teaching requires improvements to become the mainstream teaching modality (Qiao et al., 2021). In the nearly 3 years since the sudden outbreak of COVID-19, large-scale online teaching in colleges and universities is no longer a choice but an inevitable trend (Dhawan, 2020), with a shift from simple offline teaching to "large-scale, long-term" online teaching (Mamluah and Maulidi, 2021).

In early 2020, COVID-19 continued to spread in Wuhan, China. On January 27, the Ministry of Education issued a notice on its official website regarding the postponement of the spring semester, requiring universities to adopt the method of "no return to school, no stop to teaching, no stop to learning." Offline learning activities were suspended in many places, and students were provided with learning support through the Internet and informative educational resources while participating in online teaching and learning activities (Almaiah et al., 2020; Yen, 2020). For college students, by February, 2020, the Ministry of Education had organized 22 online course platforms and opened more than 24,000 free online courses, covering 12 undergraduate disciplines, with many courses offering college credit. These unified action instructions resulted in teaching being transformed from offline to online for approximately 270 million students in China. Facing the arrival of large-scale online teaching, teaching quality and learning effect must be ensured (Zou et al., 2021). Especially in higher education, the development of modern information technology promotes learning to eliminate the limitations of region and time, promote the individual diversity of learning process and learning methods, and strengthen the availability of learning opportunities (Childers and Berner, 2000). However, concerns regarding the impact on quality and effectiveness reflected in factors, such as rates of student retention, course qualification, and degrees awarded have prevented online teaching from being fully integrated into the teaching operations of colleges and universities (Daniel, 2012), despite vigorous promotion from the government and institutional organizations. Further, the uncertainty of the effectiveness of large-scale online teaching makes this problem more prominent. Therefore, it is necessary for us to evaluate students' online learning intervention to promote the evaluation.

In the context of global integration, foreign languages have become crucial for worldwide communication (Roehr-Brackin and Tellier, 2018). Several countries have developed foreign language courses at the basic education stage and regard foreign language education as an important aspect of national education quality. With the proceeding of China's reform and opening-up, foreign language learning has received increased attention (Tao et al., 2020). In higher education in China, foreign language courses are listed as public basic courses and have even become important criteria for college graduates. Moreover, popularizing foreign languages, cultivating foreign language talent, and improving foreign language teaching methods and levels are no longer only general teaching problems but also major problems affecting the improved implementation of China's opening up policy and economic and social development (Zhu et al., 2022). Learning a foreign language has also gained increasing attention from college students and has even become deeply rooted in their minds (Hu, 2018). Therefore, for Chinese college students at this stage, learning foreign languages is an important, continuous and popular course that they started from childhood (Asif et al., 2018; Guo and Qiu, 2018). In particular, following the COVID-19 outbreak, higher education in China has achieved an online teaching practice of "all regions, all coverage, and all directions" (Li and Zhu, 2020). The effects of college students learning foreign languages online and the related influencing factors have drawn the attention of schools and teachers (Li, 2022; Okyar, 2022). This is especially true for English as the most important part of foreign language learning and has always been the most concerned among the most common information. English has become the most widely used language across all aspects of human life (Asif et al., 2018; Guo and Qiu, 2018). According to the announcement of the Ministry of Education in 2020, the proportion of Chinese college students learning English is 91%, which exceeds the popularity of any other course at this stage. Therefore, this study takes English learning as the research object, which has good universality.

Following the COVID-19 outbreak, many scholars have studied the changes of students' learning efficiency, learning satisfaction, and other aspects in this situation (Almaiah et al., 2020; Yen, 2020), and have shown that many students face wide-ranging challenges in learning autonomy and control (Syah, 2020; Windhiyana, 2020; Teng and Wu, 2021) when taking intensive online courses for the first time (Dhawan, 2020). This can also trigger various negative emotions in students, such as confusion, anxiety, depression, and even weariness and burnout, making it difficult to ensure the effectiveness of foreign language learning (Wu and Li, 2020; Wang and Zhang, 2021; Wang and Su, 2022). Further, large-scale surveys on online teaching during COVID-19 revealed certain problems that largely restrict the effectiveness of online foreign language learning (Boonchuayrod and Getkham, 2019), such as poor communication between teachers and students, students' weak autonomous learning ability, insufficient student participation (Kahu and Nelson, 2018; Chen and Cao, 2020; Yang et al., 2020), and students falling into the virtual absence state of "online but not studying" (Zeynali et al., 2019). Therefore, many scholars have discussed how to improve foreign language learning (Guo et al., 2022), and posited that learning motivation (Ramkissoon et al., 2020; Purwaamijaya et al., 2021; Pan et al., 2022), willingness (Menéndez et al., 2018; Widayanti and Suarnajaya, 2021), and learning input (Habok and Magyar, 2018; Hou, 2018; Huang et al., 2018) are key factors in facilitating college students' foreign language learning. Some scholars have argued that the online technology and teaching methods teachers use, as well as their interactions with students, are important factors affecting foreign language learning for college students (Çankaya, 2018; Martin et al., 2019; Cai, 2021). In addition, some scholars believe that online interactive teaching, curriculum structure debugging, learning support, and learning environment are key factors affecting online foreign language learning (Bao, 2014; Bao et al., 2021).

However, previous researches have only analyzed the factors influencing students' learning performance of college foreign languages (LPCFL), failing to examine the specific effects of either an organized online teaching intervention on LPCFL or the endogeneity between factors during the COVID-19 period. Here, an organizational intervention is a project carried out when universities adopt large-scale online teaching modalities. Therefore, according to data availability, this study used online English teaching at a college in Jiangxi Province (middle of China) for the research sample, and divided students into a treatment group (intervention students) and a control group (non-intervention students) according to whether they participated in the school's online teaching intervention. The formal implementation of online teaching in response to COVID-19 in the spring semester of 2020 was taken as the landmark event for a quasi-natural experiment. This study applied the difference-in-difference (DID) method to test the impact of an online teaching intervention on students' LPCFL and its path of action. It aimed to find an effective method for optimizing college students' foreign language learning effects while considering the endogenous problems among several influencing factors.

Three main research contributions were made in this study. Firstly, the study organically links macro support policies and micro-learning behaviors in the COVID-19 context and proposes an exogenous event as an online teaching intervention to comprehensively investigate the relationship between macro intervention policies and learning behaviors. This is not only helpful in clarifying the effects of macro policies on students' learning behaviors and the related action mechanism but also provides evidence regarding the micro-learning performance consequences of the examined online teaching intervention. Secondly, this study contributes to the research on factors that influence students' foreign language learning. LPCFL is influenced by several factors, including teaching interventions, internal class governance, and external policy support. This study examined the impact of an online teaching intervention on students' LPCFL, indicating that macro policy is also an important factor affecting learning effectiveness. Thirdly, at the micro level, this study can provide a novel research perspective for macro policy implementation entities. The findings indicate that the online teaching intervention expands learning support through corresponding policy intervention, while improving learning input in the implementation process (Cho et al., 2017). Further, the transmission mechanism of the online teaching intervention is fully revealed: introduction of the online teaching intervention → increased policy support → increased student input (support) → improved LPCFL. Additionally, from an online teaching perspective, this study also explains the discipline-level differences in students' LPCFL and the polarization effect on the policy organization path. This further enhances the current understanding of how an online teaching intervention can affect LPCFL and can provide a reference for universities and relevant departments to effectively implement online teaching interventions.

The remainder of this paper is structured as follows. Section 2 provides the literature review and research hypotheses. Section 3 describes the research design. Section 4 presents an empirical examination of the impact of an online teaching intervention on students' LPCFL from the perspective of students' learning support and input and the operational mechanism. Section 5 describes the further examination of cross-sectional differences in the impact of the online teaching intervention on students' LPCFL from the perspectives of discipline and policy organization. Section 6 provides research conclusions and policy recommendations.

2. Literature review

2.1. Online teaching interventions

Continuous scientific and technological development has led to the new teaching mode of online teaching, also known as online education or online learning. Especially since the COVID-19 outbreak, online teaching has been considered a new method for imparting knowledge and teaching courses through the Internet (Aretio, 2020; Huang and Wang, 2022). Several scholars have noted that online teaching is a process by which all teaching parties can obtain high-quality online learning resources and effectively construct knowledge and skills through interactive network-reliant learning (Adedoyin and Soykan, 2020; Patricia, 2020). Online teaching relies on existing science and network technology to provide a simulated teaching environment, share online resources, and record data timeously to maximize learners' subjective initiative (Yang et al., 2020). This talent-training activity relies on the Internet and teachers can impart knowledge to learners and improve their skills in a planned and purposeful way (Long and Zhang, 2014). Online teaching move traditional courses to online platforms and perform corresponding adjustments to the online teaching context (Ravenna et al., 2012). However, teachers often lack higher requirements of online education technology capabilities (Bao et al., 2021; Bardach et al., 2021). Although the total amount of students' free time has increased, the time students spend on entertainment, especially WeChat, QQ, microblogs, and other online social platforms, has created a significant crowding-out effect on academic time input, reducing it by 15.17% (Mokel and Canty, 2020). In addition, online teaching can make it difficult to create a good atmosphere for peer learning (Kuo et al., 2014; Alamettala and Sormunen, 2020); therefore, colleges and universities must organize online teaching interventions (Garrison and Kanuka, 2004; Pascoe et al., 2022).

Institutions have provided various online teaching interventions, which can be summarized into four categories: online interactive interventions, curriculum structure adjustments, online learning support, and online learning environment interventions. Learning is a process of constructing knowledge in social situations (Bao, 2020), rather than passive acceptance. The essence of online teaching is a learning modality that separates teachers and learners in time and space (Simonson et al., 2009). Adequate and effective interactions are key to improving the effectiveness of online teaching (Moore, 1989; Ally, 2004; Offir et al., 2008). Existing studies have noted that interactive online interventions will significantly promote effectiveness in the online teaching process (Swan, 2001) as well as improve teachers' guidance and feedback to promote benign teacher-student interactions, form a positive learning atmosphere, and set positive self-behavior expectations, thereby improving online teaching effectiveness (Eom et al., 2006; Elnashar, 2018).

Online teaching media is not a factor that directly promotes students' learning. By contrast, based on the characteristics of Internet digital media, the design and adjustment of a flexible online curriculum structure are crucial for ensuring the effectiveness of online teaching (Clark, 2001). Digital media development enables the provision of visual and dynamic teaching practices in virtual reality—a way of expressing and presenting that traditional paper, books, and other media cannot achieve. Online teaching can design and organize a better learning experience and create a unique learning environment based on specific teaching content and with the help of digital technology (Rapanta et al., 2020). Therefore, organizational interventions focus on promoting the formation of flexible curriculum structures, appropriate teaching methods, visually appealing content layouts, interactive teaching design, and organized and structural hints in the teaching process, to promote student reflections on learning, facilitate in-depth learning, and improve the effectiveness of online teaching (Dabbagh, 2007).

In the online teaching process, organizations need to provide strong learning support that primarily comprises two elements: instructional and technical support. Instructional support refers to teachers providing online learning materials and feedback to help students perceive changes in teaching methods and their environment in teacher-student interactions and adapt as quickly as possible (Kang and Im, 2013; Leung et al., 2021). By contrast, technical support refers to ensuring the smooth implementation of online courses through various technical means, creating a student-centered learning environment (Revere and Kovach, 2011), improving students' academic participation, increasing teacher-student interactions (Bernard et al., 2009), and strengthening peer collaboration between students to improve online teaching effectiveness (Borokhovski et al., 2012). The effectiveness of online teaching not only depends on students' individual characteristics but is also significantly affected by the online learning environment (Thurmond et al., 2002). Therefore, the online learning environment in which an intervention is implemented is another powerful condition, and factors such as network fluency, platform stability, and strong information technology infrastructure are prerequisites for online learning (Ayeb-Arthur, 2017; Rapanta et al., 2020). Thus, the following hypothesis is proposed:

> *H1*: Online teaching interventions have a positive effect on LPCFL.

2.2. Formative mechanism of the impact of online teaching interventions on LPCFL

Educational researchers have paid close attention to the topic of teaching effects. Through comparative research, several scholars have argued that online and traditional classroom teaching overlap in teaching principles and have no significant differences in learning effects (Clark, 1994; Carter, 1996; Means et al., 2013). Online teaching should be carefully designed to integrate learning objectives, specific learning activities, and measurable results (Muilenburg and Berge, 2001; Oblinger and Hawkins, 2006). Since the 1980s, quality evaluations of teaching and students' learning effects have gradually become an important trend in research on colleges and universities (Li, 2021). Among various factors that affect LPCFL, most scholars argue that the characters of college students are more decisive (Rapanta et al., 2020; Shao et al., 2020). Among the characteristics that influence individual differences among college students, controllable factors such as learning motivation, ideas, and strategies, are key compared with uncontrollable factors such as intelligence, personality, and learning ability (Wu and Li, 2020). Among various factors, students' learning input and support are crucial in determining the quality of online learning (Denovan et al., 2019; Rao and Wan, 2020).

Mosher and Mac Gowan (1985) were the first to propose the theory of learning input, positing that learning input, referring to an individual's full energy, flexibility, and positive emotions, was the embodiment of learners' understanding of the learning essence and immersion in the learning process. Learning input refers to the time and energy students spend on educational activities (Kuh et al., 2007; Guo and Gao, 2022). Students' learning input indicates their degree of engagement, in which students actively participate in the learning process (Reeve, 2012) and experience positive emotions (Bao and Zhang, 2012; Osher et al., 2016); moreover, it reflects the combined interaction and influence of dimensions such as behavior, emotion, and cognition (Pauline et al., 2012). Learning input is closely related to learning effects. If students can fully participate in learning, their academic performance will improve (Broadbent and Poon, 2015). However, online and traditional learning have substantial differences. In addition to the skills required to cope with traditional learning, students must quickly adapt to online teaching scenarios, use network resources to achieve autonomous learning, and cultivate ways of thinking and problem-solving abilities under information conditions (Johnson and Sinatra, 2013).

Learning input in foreign language learning is a multidimensional construct, specifically referring to the degree of effort or investment students make in language knowledge and skills and related knowledge in the learning process (Guo and Liu, 2016; Yang et al., 2020). The most important variables positively and directly affecting foreign language learning effectiveness include behavioral, cognitive, emotional, and social input (Liu and Guo, 2021; Zhang, 2022). However, at present, overall learner participation (Yang et al., 2020) and course completion rates (Rao and Wan, 2020) are low for online learning, which will inevitably impact the effectiveness of online teaching and learning. Students most directly experience online teaching; thus, their learning input is the basic element for promoting their active learning and improving online teaching effectiveness (Webber et al., 2013; Kahu and Nelson, 2018). Overall student learning input can be measured by physical and psychological inputs (Astin, 1970, 1997; Zimmerman and Schunk, 2011), which are important factors in predicting teaching effectiveness and academic achievement. Compared with traditional offline teaching, in online teaching, students must have higher self-directed and self-learning abilities; they are constrained by space barriers as students cannot meet in groups and often learn from their bedrooms (Otter et al., 2013). The students' peer interaction frequency is far lower than the interaction between teachers and students, as well as that between individual students and teaching content (Kuo et al., 2013; Wang, 2019). In online teaching situations, college students' academic input at the behavioral and cognitive levels has been significantly improved (E and Shen, 2020); however, shortcomings have been noted, such as poor teacher-student communication, weak independent learning abilities among students, and insufficient student participation (Zhang and Hao, 2019; E and Li, 2020), making students more likely to experience the virtual absence state of "online but not studying." The lack of high-quality independent input from students largely restricts the effectiveness of online teaching (Chen and Cao, 2020).

Learning support is an important factor in improving LPCFL (Dai, 2021; Li et al., 2021) and generally includes two levels. Firstly, it can be provided externally, such as through college organizations and concern from teachers. This can aid students' academic performance, spiritual affirmation, and encouragement, which are the main social supports that students receive in schools (Ghaith, 2002; Dewaele and Alfawzan, 2018; Jiang and Dewaele, 2019). Specifically, it can be divided into the two dimensions of emotional and professional support. Factors such as effectively providing support, improving college students' participation in foreign language learning, increasing the depth of students' learning experiences, and stimulating students' learning motivation are key to improving LPCFL through external support (Li et al., 2019; Liu et al., 2021). In general, the more learning support students perceive, the higher their online learning performance will be (Li et al., 2018; Rao and Wan, 2020). Therefore, increasing support for students' learning through online teaching is crucial to improve online students' participation and learning effectiveness (Lei et al., 2018). Secondly, students can provide internal support *via* emotional and behavioral support for their own online learning, which is also the most direct expression of their learning willingness and interest (Li, 2020; Tan and Fu, 2020). When students perceive external support from their colleges and teachers, they will also show higher levels of internal learning interest and support (Zhang, 2012; Wang and Jiang, 2022), more actively participate in teaching activities, and increase their learning input (Fisher et al., 2021). Additionally, external learning support can improve students' learning adaptability, which is positively related to their learning interests, classroom participation, and academic performance (Ghaith et al., 2007; Piniel and Albert, 2018; Liu and Guo, 2021). Thus, based on the above, the following hypothesis is proposed:

> *H1*: Learning input and learning support are the intermediary paths between online teaching interventions and LPCFL.

3. Materials and methods

3.1. Sampling

This study aims to understand the impact of an online teaching intervention on LPCFL. Quarantine procedures vary across different countries, and the COVID-19 pandemic has influenced people's psychological characteristics. The differences in cultures and epidemic prevention methods in different countries are subject to different psychological interventions. As it would be impracticable to include a sample from each country, we collected samples from one college in Mainland China. We adopted a purposive sampling method and established several conditions during sampling to ensure the representativeness of the research sample. First, we selected Mainland China as the main area for sampling, as this was where the pandemic was initially the most severe, and it had the strictest quarantine policies. Thus, the sample is representative to a certain extent. Second, we focused on teachers and students to understand the status of online teaching intervention; thus, colleges were selected as the main sampling context. As a typical strict control intervention mode, China has chosen Chinese Mainland as the main sampling area, because it is the most severely affected area and has the strictest quarantine policy. All universities in China have adopted the model of reducing offline teaching and increasing online teaching. Therefore, using a single university as a sample is also representative. Students' evaluations may be incomparable because of the differences in the degree of difficulty and boredom of the courses in varied disciplines at different universities. Therefore, English teaching implemented in the whole school is selected as the research sample, excluding all other courses in the school, including the behavior of the administrative department to accurately collect representative samples.

Further, we collected data from the same respondents each semester from teacher evaluation records, student learning records, and student questionnaires, which may have led to common method bias. Accordingly, we used Harman's single-factor verification test and the DID method to analyze all the measurement items using a non-rotating matrix.

3.2. Scale development

The back translation method was applied to construct the measurement for this study. First, the researchers invited an expert proficient in both Chinese and English to translate the original English scale items into Chinese and then invited another bilingual expert to translate the Chinese version into English without knowing the original scale. A scholar in the education field conducted the final review to ensure that the meaning expressed by the questions remained consistent with the original scale (i.e., between the original English questionnaire and the translated English questionnaire).

In view of the structural changes in students' learning input between online and offline teaching situations, previous research has typically adopted the two categories of students' skill and manifestation input. The former includes five indicators: completing assignments on time (S11), time invested in learning (S12), listening conscientiously (S13), obeying classroom discipline (S14), and consulting teachers individually after class (S15). The differences in students' learning time investment have been found to lead to significant differences in their perceptions of online and offline teaching effectiveness (Hiltz et al., 2000). Therefore, we included students' time investment and other inputs to explore the changes in students' skill input across different teaching situations. In selecting the two intermediary dimensions of students' learning input and learning support, this study was based on the online learning input and support scale compiled by Marcia and Dixson (2010). The dimensions of students' learning input and support were determined referring to the relevant indicators in the learning input and support questionnaire designed by Gunuc and Kuzu (2015) and the learning input and support evaluation scale designed by Hamish and others (Coates, 2007). The former measure includes skill input and learning expression input, whereas the latter includes emotional and interactive support.

The "learning input" includes "skills input" and "manifestation input"; the former has five parts, which are "complete assignments on time," "time invested in learning," "listen conscientiously," "obey classroom rules," and "consult teachers individually after class." The latter includes three parts, which are "online and offline learning are considered to be the same," "actively seek out learning resources for self-directed learning," and "overall satisfaction with the e-learning results." "Learning support" includes "emotional support" and "interactive support"; the former includes four parts which are "think online learning is quite helpful," "be willing to study with classmates," "be willing to share opinions in online courses," and "not afraid of learning difficulties" The latter includes five parts, which are "participate in class discussions," "gains in the discussion," "sense of belongingness," "will pay attention to others," and "discuss course-related issues with classmates after class." Each part is scored freely with a full score of five points. Finally, several parts are added to get the total score. For comparability, the total score is changed into a percentage system.

3.3. Survey design and administration

We referred to self-reported measures used in previous studies to assess students' LPCFL (Al-Azmi, 2018). The measure for the online learning invention was compiled with reference to Ajzen (1991) and Khzam and Lemoine (2021) and comprised two measurement items. The measurement of learning input and learning support were compiled referencing Ajzen (1991) and included two measurement items. The measurement of learning input was compiled referencing Bagozzi and Pieters (1998) and used to evaluate the emotional responses of students to achieve performance goals set. Learning support was measured using items developed by Bagozzi and Lee (2002), which evaluated the useful environment and students' sense of identity with online teaching.

Additionally, existing research has shown that the teaching effectiveness of online courses is heterogeneous. A comparison of online and traditional offline learning showed that gender is an effective moderator of online teaching effectiveness (Figlio et al., 2013). Another study found that in a traditional offline model, the performance of female students was significantly lower than that of male students. However, with online learning, no significant gender differences were observed (Brown and Liedholm, 2002). In addition, some differences have been reported in evaluations of online course teaching effectiveness by students with different majors and in varied school years (Chen and Jia, 2020). Similar majors in Chinese universities are managed uniformly in one department; therefore, we include relevant variables in this study, such as students' individual characteristics, department differences, and school years as controls to improve the reliability of the findings. Table 1 summarizes the relevant variables used and

TABLE 1 Relevant variables and their operational definitions.

Variables	Variable name	Index	Operationalization
Dependent variable	Learning performance	Learning attainment	Satisfaction score (students evaluate according to 5 points into full scores)
Independent variable	Teaching intervention	Whether to intervene	Intervention = 1, No intervention = 0
	Time	Before and after the COVID-19 outbreak	Before COVID-19 = 0, After COVID-19 = 1
Intermediary variables	Study input (studyin)	Skills input (S1)	Complete assignments on time(S11), time invested in learning (S12), listen conscientiously (S13), obey classroom rules (S14), consult teachers individually after class (S15)
		Manifestation input (S2)	Online and offline learning are considered to be the same (S21), actively seek out learning resources for self-directed learning (S22), overall satisfaction with the e-Learning results (S23)
	Study support (studysu)	Emotional support (S3)	think online learning is quite helpful (S31), be willing to study with classmates (S32), be willing to share opinions in online courses (S33), not afraid of learning difficulties (S34)
		Interactive support (S4)	Participate in class discussions (S41), gains in the discussion (S42), sense of belongingness (S43), will pay attention to others (S44), discuss course-related issues with classmates after class (S45)
Control variables	Individual characteristics	Gender	Dummy variable, male = 1, female = 0
		Year	Freshman = 1, Sophomore = 2, Junior = 3, Senior = 4
		School	Dummy variables, 15 schools, evaluate 1 to 15 respectively

their operational definitions including the sub-items for each variable.

3.4. Demographic profile

This questionnaire was collected by the college's Office of Academic Affairs through compulsory means. As it involves students' achievement, it was collected comprehensively, and the 142,151 survey results obtained were valid to our study. The statistical characteristics of the survey results are shown in Table 2.

As shown in Table 2, these answers show good diversity and stability. The distribution of participants' gender and grade is relatively stable. The number of participants before and after the epidemic and the number of students receiving intervention and not receiving intervention is the same.

3.5. Methodology

We used the difference in difference (DID) approach to test this study's research hypotheses. The substitution variable approach was applied using State 16.0 to confirm reliability and validity. In recent years, DID models are mostly used for quantitative evaluation of the implementation effect of public policies or projects in each field. Compared with other methods, the DID model is suitable for this study because the research objective is exploratory research for theory development, the analysis is for assessment purposes, the model is complex and includes one or more formative constructs. Thus, DID can determine the effect of the online intervention implementation.

Regarding the benchmark model, the following model was designed according to the principle of the DID model to identify the effects of an online teaching intervention on LPCFL:

$$\text{perform}_{\text{it}} = \theta\left(\text{treat}_{\text{it}} * \text{post}_{\text{it}}\right) + \beta \text{x}_{\text{it}} + \lambda_{\text{t}} + \mu_{\text{i}} + \varepsilon_{\text{it}} \qquad (1)$$

where i, t, and j represent students, semesters, and colleges, respectively. Performance refers to students' LPCFL, which was measured using self-assessment. Treat is the intervention grouping variable; when treat equals 1, it represents the intervention group, and when treat equals 0, it represents the non-intervention group. Post is a time grouping variable because Chinese universities have

TABLE 2 Demographic characteristics of respondents (n=142,151).

Variable name	Index	Operationalization	Number of samples	percentage
Learning performance	Learning attainment	/	/	/
Teaching intervention	Whether to intervene	Intervention	78,325	55.1%
		No intervention	63,825	44.9%
Time	Before and after the COVID-19 outbreak	Before COVID-19	60,272	42.4%
		After COVID-19	81,879	57.6%
Individual characteristics	Gender	Male	61,267	43.1%
		Female	80,884	56.9%
	Year	Freshman	77,330	54.4%
		Sophomore	55,438	39.0%
		Junior	8,529	6.0%
		Senior	852	0.6%
	School	School of Business Administration	10,093	7.1%
		School of Finance, Taxation, and Public Administration	11,372	8.0%
		School of Accounting	18,764	13.2%
		School of International Business and Economics	8,245	5.8%
		School of Economics	6,397	4.5%
		School of Finance	12,367	8.7%
		School of Statistics	8,245	5.8%
		School of Information Management	8,956	6.3%
		School of Tourism and Urban Management	4,975	3.5%
		School of Law	5,970	4.2%
		School of Software and Internet of Things Engineering	12,651	8.9%
		School of Foreign Languages	5,117	3.6%
		School of Humanities	4,975	3.5%
		School of Art	8,386	5.9%
		School of Physical Education	1,705	1.2%
		School of International	13,930	9.8%
		School of Virtual Reality (VR) Modern Industry	3	0.0%

two semesters: spring (March–mid-July) and autumn (September to mid-January of the next year). The value of 3 semesters from the autumn semester of 2018 to the autumn semester of 2019 is 0. The value of 4 semesters from the spring semester of 2020 to the autumn semester of 2021 is 1. X represents the control variables. Referring to existing research, we controlled for students' department of study, school year, and gender. The 15 departments were represented by dummy variables of 1–15. The school year was expressed as years 1–4. Student gender (gender) was represented by a dummy variable (male = 1, female = 0). Time-fixed effects described the samples in greater detail than time grouping (post) and individual-fixed effects described the samples in greater detail than student grouping (treat). Therefore, adding treat and post items to model (1) was unnecessary. Instead, we only added their cross items; thus, model (1) is actually a DID model based on two-way fixed effects. λ_t represents time-fixed effects, μ_i represents students' individual fixed effects that did not change with time, and ε represents a random disturbance term. According to the principles of the DID model, this study focused on the cross-term treatment*post coefficient of post θ, which represents the influence of the online teaching intervention on students' LPCFL after excluding other potential interference factors. In addition, because of the adaptability of teachers and students to the intervention policy during the COVID-19 pandemic and the lag and timeliness of the intervention effect, we had reason to believe that the impact of the online teaching intervention on students' LPCFL would be non-linear (Latif, 2022).

Next, we examined the path from the online teaching intervention to its effects on students' LPCFL. This study proposes that, because of differences in the learning basis and requirements of students with different majors (although these students have different choices in learning models), the path of foreign language learning achievements will ultimately be reflected in learning input and learning support. Thus, this study examined whether the online teaching intervention affected students' LPCFL with respect to learning input and learning support. To design a model to test this empirically, we referred to Li and Zheng (2016), and Fan and Peng (2004), and included regulatory variables in the benchmark model to test for the significance of the impact mechanism. The specific model design is as follows:

$$\begin{aligned} \text{studyin}_{\text{it}} &= \theta(\text{treat}_{\text{it}} * \text{post}_{\text{it}}) + \beta \text{x}_{\text{it}} + \lambda_{\text{t}} + \mu_{\text{i}} + \varepsilon_{\text{it}} \\ \text{studysu}_{\text{it}} &= \theta(\text{treat}_{\text{it}} * \text{post}_{\text{it}}) + \beta \text{x}_{\text{it}} + \lambda_{\text{t}} + \mu_{\text{i}} + \varepsilon_{\text{it}} \end{aligned} \quad (2)$$

$$\begin{aligned} \text{perform}_{\text{it}} &= \theta \text{studyin}_{\text{it}} + \beta \text{x}_{\text{it}} + \lambda_{\text{t}} + \mu_{\text{i}} + \varepsilon_{\text{it}} \\ \text{perform}_{\text{it}} &= \theta \text{studysu}_{\text{it}} + \beta \text{x}_{\text{it}} + \lambda_{\text{t}} + \mu_{\text{i}} + \varepsilon_{\text{it}} \end{aligned} \quad (3)$$

where perform refers to LPCFL and learning input and learning support are intermediary variables. Existing research has mostly examined students' learning input and support levels using questionnaires and their usual performance (Zhang et al., 2014; Guo et al., 2018). Compared with the questionnaire, usual performance is timelier and more realistic, and can better reflect a student's commitment behavior and willingness. Therefore, we used a combination of questionnaire responses and usual performance as proxy variables for learning input and learning support. The other variable definitions are the same as in Model (1).

3.6. Data analysis

This study uses questionnaire surveys to determine the research sample; therefore, it is necessary to test the reliability and validity. At the same time, to ensure the accuracy of the test, this study further uses Stata 16.0 for confirmatory factor analysis (CFA). Data test results show that Cronbach's α of all constructs in Table 3 are higher than 0.8. According to the research standard, when the coefficient of Cronbach's α exceeds 0.7 (Cao et al., 2022), the reliability is significant. AVE and CR of all dimensions in Table 3 are higher than the recommended values of 0.5 and 0.8; thus, all dimensions in this study have good convergence effectiveness.

Using the collected data, we conduct a univariate t-test analysis on all samples to preliminarily explore the differences in students' LPCFL before and after the intervention implemented in response to the COVID-19 outbreak. The purpose is to determine whether the students' LPCFL in the treatment group was influenced by the intervention as posited by this study. In addition, the impact and its mechanism are also assessed using DID analysis. Thereafter, heterogeneity regression analysis is conducted to examine the effects of the students' individual character dimensions on teaching performance.

According to the classification method described above, all samples were divided into the intervention (treatment) and non-intervention (control) groups. The treatment and control groups reflected the LPCFL of students who had and had not received the online learning intervention, respectively. Prior to COVID-19, there were three semesters from the autumn semester of 2018 to the autumn semester of 2019, and after the COVID-19 outbreak, there were four semesters from the spring semester of 2020 to the autumn semester of 2021. The results are shown in Table 4.

As Table 4 shows, prior to COVID-19, a minor difference in LPCFL existed between the treatment and control groups. Specifically, the average LPCFL of students in the treatment group was 0.0987 scores higher than that of the control group (the significance level was 1%, with a corresponding *t*-value of 13.0242). This indicated that prior to the COVID-19 outbreak, the LPCFL of the students in the treatment group was not significantly higher than that of the control group. This was because the school used for the study site had a course selection system that allowed students to choose their teachers. Further, the students in the treatment group were relatively active learners. However, although differences existed among students in course selection classes, the difference was minor. After the COVID-19 outbreak, generally, students in the treatment group showed high learning performance with strong comprehensive advantages and tended to "choose the courses by good teachers" and receive intervention and support from the school (Jiang et al., 2021). After the implementation of the online learning intervention, the average LPCFL of the students in the treatment group remained significantly higher than that of those in the control group (the significance level was 1%, with a corresponding *t*-value of 10.2668), and the difference between the two increased from 0.0987 before the online learning intervention to 0.2596 post the intervention. This shows that the online learning intervention indeed played a significantly positive role in improving the LPCFL of the students in the treatment group, widening the gap between the treatment and control groups. However, whether this gap is statistically significant required further testing using the DID model.

4. Results

4.1. Parallel trend test

According to the univariate analysis of students' LPCFL, implementing the online learning intervention widened the LPCFL gap between students in the treatment group and those in the control group by more vigorously boosting the LPCFL of

TABLE 3 Scale measurement.

	1	2	3	4	5	6	7	8
1. Learning performance	0.712							
2. Skills input (S1)	0.298**	0.815						
3. Manifestation input (S2)	0.842	0.250**	0.766					
4. Emotional support (S3)	0.796	0.306*	0.592*	0.877				
5. Interactive support (S4)	0.443*	0.625	0.672	0.424*	0.914			
6. Gender	0.924	0.126**	0.606	0.849	0.298**	0.859		
7. Year	0.829	0.460	0.250**	0.798	0.422**	0.756	0.891	
8. School	0.255**	0.144**	0.765	0.223**	0.386**	0.339**	0.337**	0.923
Cronbach's α	0.831	0.829	0.812	0.898	0.835	0.813	0.824	0.875
AVE	0.896	0.845	0.891	0.872	0.818	0.816	0.792	0.769
CR	0.882	0.914	0.869	0.917	0.874	0.902	0.866	0.897

** $p < 0.01$.
* $p < 0.05$.

TABLE 4 Online learning intervention and students' foreign language learning performance: Univariate *t*-test results.

	Treatment group (1)	Control group (2)	Difference (1)–(2)	*t*-test (1)–(2)
Before COVID-19	22.75452	22.65581	0.0987	13.0242***
After COVID-19	22.97826	22.71864	0.2596	10.2668***

*** $p < 0.01$.

students in the treatment group. However, this does not substantively prove that the online learning intervention can promote students' LPCFL for two reasons. First, whether this gap is statistically significant is unknown. Second, univariate analysis can neither control for other individual variables that affect students' LPCFL nor exclude interference from other influencing factors on the estimation results. Therefore, to estimate the impact of the online learning intervention on students' LPCFL more accurately, we further controlled for students' characteristic variables, individual fixed effects, and time-fixed effects and adopted a more rigorous DID model for estimation analysis. The results are shown in Table 5.

The regression results in Table 5 show that, after controlling for students' characteristic variables, the coefficients of the treatment items, post items, and treatment*post items of concern in this study were positively significant at the 1% level. This indicates that, compared with the students in the control group, the online learning intervention significantly improved the LPCFL of the students in the treatment group. Thus, the online learning intervention substantially boosted students' LPCFL, and H1 cannot be statistically rejected.

4.2. Main intervention effects on LPCFL

Based on a quasi-natural experiment of an online teaching intervention, this study used the DID model to investigate the impact of the intervention on students' LPCFL.

4.2.1. Placebo test

To ensure the robustness of the research findings, we conducted a placebo test by constructing a false treatment group and false intervention year to further verify the impact of the online teaching intervention on students' LPCFL and confirm whether it was affected by missing variables. Referring to Liu et al. (2022), we tested the correctness of the intervention object of online teaching using DID for a constructed false handling group. Among the samples in this study, the students had learned foreign languages for seven semesters. Each semester included approximately 20,000 samples; 10,000 samples were randomly selected and a kernel density map of the regression coefficients of 1,000 random shocks and the corresponding *p*-value distribution were created (Figure 1).

Figure 1 shows that the estimated values of the randomly generated variable samples impacted by COVID-19 are generally concentrated around 0, the *p*-values of the estimated values are large, and most of the variables are not significant; thus, the test did not passed. This indicates that the study's results are not affected by missing variables. As suggested by Armstrong and Overton (1977), the verification check, DID, was conducted to determine whether significant differences were present between the two groups. The verification results showed a significant difference in the LPCFL between the two groups, indicating that the problem of non-response bias was not significant. The analysis results demonstrate that the implementation of the online teaching intervention during the COVID-19 pandemic significantly improved the LPCFL of the participants, and this conclusion remained valid after a placebo test was used to control for potential problems with endogeneity. Therefore, no common method bias was present in this study.

TABLE 5 Online teaching intervention and students' LPCFL: DID results.

	(1)	(2)	(3)
Post	0.2046***(0.0099)		0.0646**(0.0319)
Treat	0.1479***(0.0165)		0.0889***(0.0208)
Treat*post		0.2335***(0.0097)	0.1550***(0.0335)
Gender	0.0001(0.0007)	0.0000(0.0007)	0.0001(0.0007)
Year	0.0956***(0.0076)	0.0964***(0.0075)	0.0952***(0.0076)
Department	0.0005(0.0009)	0.0005(0.0009)	0.0003(0.0009)
C	22.5608***(0.0176)	22.6849***(0.0121)	22.6139***(0.0210)
R^2	0.0054	0.0054	0.0056
Obs	142,151	142,151	142,151

***$p < 0.01$, **$p < 0.05$.

4.2.2. Robustness test

To further verify the stability of this conclusion, the proxy variable was replaced again. Specifically, students' actual final exam scores were used instead of LPCFL. Table 6 shows the results of the robustness test through substitution variables.

The regression results in Table 6 show that the online learning intervention significantly improved the LPCFL of the students in the treatment group after the alternative index of LPCFL was applied. This indicates that the conclusion is robust and H1 cannot be statistically rejected.

4.3. Moderating effects of learning input and learning support

Regarding the path through which the online teaching intervention can boost students' LPCFL, the theoretical analysis indicates that, although different students have different foreign language learning endowments and technologies, the path to improving student performance will ultimately be reflected in learning input and support. Thus, whether learning input and support are factors through which the online teaching intervention can boost students' LPCFL needs to be determined. Therefore, we tested the mediating effects of learning input and support in the relationship between the online teaching intervention and students' LPCFL. Learning input and support were each expressed from two aspects: learning input includes skill input (S1) and expression input (S2), and learning support includes emotional support (S3) and interactive support (S4). The maximum variance inflation factor value in the models was 1.665, which was less than 3.3, indicating that collinearity was not a problem in this study (Petter et al., 2007; Table 7).

The results of process model 7 show that the mediating effect of learning input and support was significant, indicating that the online teaching intervention promoted learning input and learning support. Compared with learning input, the online teaching intervention better promoted learning support; however, both learning input and support could effectively promote students' LPCFL. Although learning support may have less of a promotion effect on students' LPCFL compared with learning input, both play a strong intermediary role, which supports H2.

5. Influence of the online teaching intervention on LPCFL: A heterogeneity test

The above empirical results show that the online teaching intervention explored in this study significantly improved students' LPCFL. To test whether students in different majors and organization types can improve their LPCFL through an online teaching intervention, we further divided the students of the treatment group into three groups—humanities, science and engineering, and economics and management disciplines according to students' majors—and simultaneously, divided the students of the treatment group into four groups by the organization type: "college teaching management: teachers," "college teaching management: students," "student management groups: teachers," and "student management groups: students." Here, the student grouping variable "treat" differed from the setting in model (1), in that "treat = 0" still represented the control group in model (1), but "treat = 1" no longer represented all students affected by the online teaching intervention. Instead, it represented students of different majors and intervention organization types.

5.1. Test based on discipline characteristics

Through a text analysis of the students' major subjects, this study divided the treatment group in the original model (1) into three groups (i.e., humanities group, science and engineering group, and economics and management group) according to the students' majors. Among the 15 colleges, the humanities group included the School of Physical Education, School of Humanities, School of Foreign Languages, School of Law, and School of the Arts; the science and engineering group included the School of

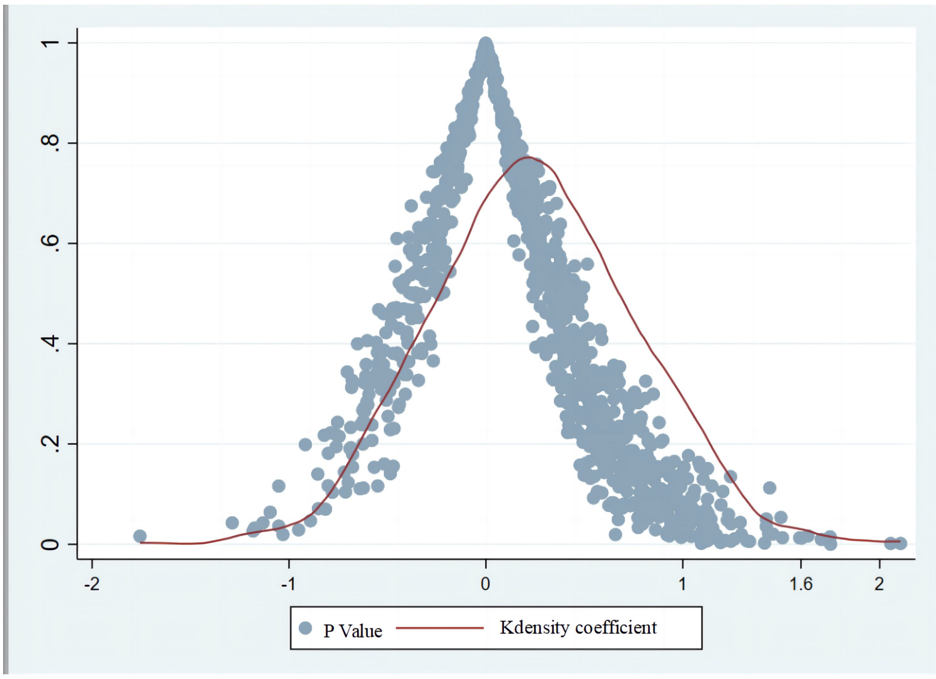

FIGURE 1
Random impact coefficient Kdensity and corresponding p-value.

TABLE 6 Robustness test of substitution variables.

	(1)	(2)	(3)
Post	0.2039***(0.0099)		0.0635**(0.0318)
Treat	0.1487***(0.0163)		0.0889***(0.0208)
Treat*post		0.2331***(0.0097)	0.1554***(0.0335)
Gender	0.0001(0.0006)	0.0002(0.0019)	0.0001(0.0012)
Year	0.0964***(0.0076)	0.0973***(0.0075)	0.0960***(0.0076)
Department	0.0002***(0.0001)	0.0003***(0.0001)	0.0003***(0.0001)
C	22.5445***(0.0174)	22.6694***(0.0107)	22.5956***(0.0206)
R^2	0.0055	0.0055	0.0056
Obs	142,151	142,151	142,151

***$p < 0.01$, **$p < 0.05$.

VR Modern Industry, School of Statistics, School of Software and Internet, and School of Information Management; and the economics and management group included the School of Accounting, School of Finance, School of Finance and Taxation, School of Business Administration, School of International Business and Economics, School of Economics, and School of Tourism Management. The regression results are shown in Table 8.

For the estimated results of the heterogeneity effect test in Table 8, Columns (1)–(3), list the estimated results on whether the online teaching intervention was able to boost the LPCFL of students in the humanities, science and engineering, and economics and management groups, respectively. The results indicate that the moderating effect of the online teaching intervention on the LPCFL of students in each discipline group was significantly positive at the 1% level. This supports the theoretical assertion of this study that, through the online teaching intervention, although students' LPCFL will vary depending on their disciplines, it can ultimately effectively boost students' LPCFL regardless of their majors. Therefore, H1 is further verified and cannot be statistically rejected.

Notably, from the coefficient value of the intervention effect, the effect values of the online teaching intervention on the LPCFL were 0.3216, 0.1123, and 0.2555 for students in the humanities, science and engineering, and economics and management groups, respectively. It can be predicted that the impact of the online teaching intervention from most to least on LPCFL for

TABLE 7 Mediation effect test.

Stage I: Independent variable-intermediate variable				
	S1	S2	S3	S4
Treat*post	0.1212***(0.0052)	0.1186***(0.0049)	0.1239***(0.0063)	0.2459***(0.0095)
Gender	0.0000(0.0009)	0.0001(0.0009)	0.0003(0.0017)	0.0002(0.0019)
Year	0.0352***(0.0040)	0.0282***(0.0038)	0.0127***(0.0049)	0.0948***(0.0074)
Department	0.0001**(0.0000)	0.0001**(0.0000)	0.0001(0.0001)	0.0002**(0.0001)
C	13.7117***(0.0057)	13.7475***(0.0054)	18.4277***(0.0069)	22.6769***(0.0104)
R^2	0.0046	0.0047	0.0029	0.0062
Obs	142,151	142,151	142,151	142,151
Stage II: Intermediate variable-dependent variable				
	(5)	(6)	(7)	(8)
S1	1.6693***(0.0023)			
S2		1.6909***(0.0028)		
S3			1.2455***(0.0024)	
S4				0.9516***(0.0010)
Gender	0.0001(0.0009)	0.0002(0.0013)	0.0005(0.0019)	0.0005(0.0031)
Year	0.0394***(0.0035)	0.0505***(0.0040)	0.0841***(0.0045)	0.0068**(0.0028)
Department	0.0008**(0.0000)	0.0017***(0.0004)	0.0027(0.0005)	−0.0002(0.0003)
C	−0.2052***(0.0322)	−0.5660***(0.0387)	−0.2536***(0.0458)	1.0965***(0.0232)
R^2	0.7865	0.7246	0.6461	0.8645
Obs	142,151	142,151	142,151	142,151

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 8 Discipline heterogeneity effect test.

	(1)	(2)	(3)
Treat*post	0.3216***(0.0252)	0.1123***(0.0237)	0.2555***(0.0118)
Gender	0.0001(0.0011)	0.0003(0.0009)	0.0001(0.0012)
Year	0.1012***(0.0206)	−0.0115(0.0164)	0.1441***(0.0094)
Department	−0.0440***(0.0082)	−0.0081***(0.0024)	0.0021*(0.0011)
C	23.3678***(0.1327)	22.8046***(0.0307)	22.6581***(0.0137)
R^2	0.0099	0.0013	0.0079
Obs	20,948	26,247	94,956

***$p < 0.01$, *$p < 0.1$.

students in each discipline group is in the order of the humanities, economics and management, and science and engineering groups. Regarding the reason for this, among the five schools of the humanities group, except for the school of foreign language, students from the School of the Art and School of Physical Education have lower starting points and higher learning requirements for foreign languages. Students from the School of Humanities and School of Law have relatively lower foreign language requirements. Thus, when participating in the online teaching intervention, the latter students had fewer extracurricular activities and more time and attention to devote to learning; thus, more learning input and support would be obtained, and LPCFL would improve faster. The students in the science and engineering group always have higher enrollment and had few extracurricular activities; thus, the potential for learning input and learning support was small Therefore, the online teaching intervention led to the lowest level of improvement in LPCFL for this group.

5.2. Test based on intervention organization mode

Through text analysis of the intervention organization mode, we divided the treatment group in the original model (1) into four types: the "teaching management: teachers" group, "teaching management: students" group, "student management: teachers" group, and "student management: students" group. The regression results of the four intervention organization mode heterogeneity effects are shown in Table 9.

Table 9 shows the estimated results of the intervention organization mode heterogeneity effect, and Columns (1)–(4), respectively, list the estimated results on whether the online teaching intervention could boost students' LPCFL under different intervention organization modes. The results indicate that the moderating effect of the online teaching intervention on students' LPCFL was significant at the 1% level and the polarization phenomenon was serious. This supports the theoretical assessment of this study that, through online teaching intervention, although students' LPCFL differed because of differences in intervention organization methods, the two organization methods from "college teaching management," which were the "college teaching management-teachers" group and "college teaching management-students" group were significantly positive. Further, the two organization methods from "college student management," which were the "student management group-teachers" group and "student management group-students" group, were significantly negative.

Next, we determined the coefficient values for the adjustment effect of the online teaching intervention. The effect values of both organization methods for teachers and students downward through college teaching management were 0.1136 and 0.0883, respectively; however, the effect values of both organization methods for teachers and students downward in the student management groups were −0.3487 and −3.2778, respectively. This indicates that the impact of the online teaching intervention was positive through college teaching management but negative through student management groups. This may be because the intervention and communication ability of the teaching management team and the cognition among teachers and students was more authoritative, and the intervention also had a more positive stimulating effect. The student management group focuses more on students' lives and daily behaviors. During the online teaching intervention, the intervention strength and its ability to be implemented in the student management group would be counterproductive and negatively affected, thereby reducing students' LPCFL.

6. Conclusion

This study used the shift to online teaching during the COVID-19 outbreak in China as a quasi-natural experiment and applied the DID method to investigate the impact of online teaching during the outbreak on students' LPCFL and the related path of action.

6.1. Research conclusion and insights

Focusing on China, this study examined the impact of an online teaching intervention on students' LPCFL and the related effects of learning input and learning support. We used foreign language learning course selection, classroom learning records, and teaching evaluation results from the last seven semesters, as well as the questionnaire survey of teachers and students during the COVID-19 period and relevant school documents. The findings of this study indicate that the online teaching intervention improved learning input and support which, in turn, increased LPCFL. Therefore, the online teaching intervention influenced students' LPCFL. The findings indicate that colleges should implement the online teaching intervention and organize it by teacher management terms, which would favorably affect LPCFL in terms of increasing students' learning input and support. Therefore, this study may serve as a reference to colleges for increasing their students' LPCFL during the COVID-19 pandemic, based on the conclusions below.

6.1.1. Significant improvements in students' LPCFL

Using DID regression, after controlling for students' characteristic variables and the fixed effects of student individuals and students' time, the analysis showed that, at the statistical level of 1%, the online learning intervention significantly improved the LPCFL of students in the treatment group. Further, after controlling for possible endogeneity through placebo and robustness tests, the conclusions remained valid. The online teaching intervention improved LPCFL by promoting students' learning input and learning support. Further, the online teaching

TABLE 9 Intervention organization mode heterogeneity effect test.

	(1)	(2)	(3)	(4)
Treat*post	0.1136***(0.0170)	0.0883***(0.0129)	−0.3487***(0.0594)	−3.2778***(0.2251)
Gender	0.0001(0.0015)	0.0003(0.0009)	0.0003(0.0022)	0.00052(0.0019)
Year	0.0655***(0.0115)	0.0906(0.0100)	0.0471(0.0346)	−0.1798(0.1331)
Department	0.0008(0.0013)	0.0002(0.0012)	−0.0002(0.0039)	−0.0557***(0.0187)
C	23.1331***(0.0208)	22.7532***(0.0167)	22.3274***(0.0480)	22.5812***(0.2751)
R^2	0.0031	0.0015	0.0030	0.1820
Obs	20,948	83,212	12,455	1,102

***$p < 0.01$.

intervention promoted additional learning support, but learning input better promoted students' LPCFL. Learning input and support were found to play strong mediating roles, which supports H2.

6.1.2. Disciplinary heterogeneity effect

Under the online teaching intervention, although students' LPCFL may vary depending on their disciplines—whether they are in the humanities group, the science and engineering group, or the economics and management group can ultimately effectively boost students' LPCFL. However, from the perspective of the coefficient value of the intervention effect, the effect value of the humanities, science and engineering, and economics and management group students is 0.3216, 0.1123, and 0.2555, respectively. We believe that this conclusion is of great significance because English teaching in China has obvious unity; that is, the same syllabus, textbooks, and teachers, and even sometimes students of different majors will be confused in the same English class, which shows that students of different majors have the same direction of feedback on interference, which is slightly different in intensity. This can be promoted in the future.

6.1.3. Polarization effects of organizational mode

Under different intervention organization modes, the adjustment effects of the online teaching intervention on students' LPCFL were significant at the 1% level; however, the polarization phenomenon was found to be relatively serious. The two organizational methods of teachers and students downward through the college's teaching management were positive, with effect values of 0.1136 and 0.0883, respectively. However, the two organizational methods of teachers and students downward through the student management group were negative, with effect values of −0.3487 and −3.2778, respectively.

6.2. Theoretical contributions

This study makes novel contributions to intervention theory. First, it validated perceived teaching intervention and organization activities (intervention organization by teaching management terms or student management terms) in the online teaching environment. Second, this study contributes to the current understanding of online teaching interventions and their effects through increasing student input and support on LPCFL in the Chinese context. Teaching theory posits that student performance is derived from students' own input and support. Similarly, when students gain a new online environment referring to foreign language learning, they access previously learned information and judgment factors to the new class space. Thus, organizing interventions from teacher management terms should improve students' own input and support and, in turn, increase their performance. Third, this study found that an online teaching intervention could significantly strengthen student performance in China. The study states that throughout the teaching intervention, students invest their learning input and learning support depending on their subjects and organization model, which are then used to appraise achievement. Consequently, online teaching interventions can stimulate learning input and learning support among Chinese students with respect to foreign languages.

Finally, this study showed that the different organization models used in the online teaching intervention resulted in a relatively serious polarization phenomenon. Prior research revealed that interventions can increase students' willingness to input learning and then enhance performance in China (Bao et al., 2021). Thus, our findings provide novel contributions to the organization model of online teaching.

6.3. Managerial recommendations

Based on this study's findings, we can provide several recommendations for college administrators and teaching managers. First, this study discovered that colleges must have interventions for "online teaching," which significantly influence students' learning performance in foreign languages. Therefore, teaching managers should prioritize strengthening their focus on students' input and support. Second, this study found that students were positively affected by the intervention regardless of their majors. Here, managers should implement interventions according to students' distinctive disciplinary characteristics. Finally, this study showed that an online teaching intervention could demonstrate a polarization effect between different organization modes. Accordingly, managers may strengthen organization among teachers through teaching management terms to increase students' willingness to learn, thereby encouraging students to enjoy their foreign language lessons. Thus, online teaching interventions will increase LPCFL and developing such interventions may help students improve their foreign language abilities.

6.3.1. Focus on disciplinary differences and adopt different methods

Students with different majors have distinctive disciplinary characteristics. When implementing an intervention, different approaches should be adopted to improve students' learning performance according to the characteristics of different disciplines of study.

6.3.2. Strengthen organizational intervention and provide strong support

Under a significant external impact, to adapt to the environment as soon as possible and further improve students' adaptability, organizations should strengthen their interventions, especially through support, such as resources, information, and funds, to promote students' learning input and support and improve their learning performance.

6.3.3. Pay attention to intervention subject organization and use authoritative channels

The effects of online teaching interventions are transmitted downward through a school's teaching and student management groups, creating a polarization effect. This is because the intervention and communication ability of the teaching management team and the cognition among teachers and students will be more authoritative, and the intervention will also have a more positive stimulating effect. In contrast, the student management group will pay more attention to students' lives and daily behaviors. The online teaching intervention's strength and ability to be implemented under the student management group will be counterproductive and negatively affected, thereby reducing LPCFL. Therefore, it is better to choose more appropriate and authoritative channels for implementing online teaching interventions.

6.4. Limitations and future research scope

This study has some limitations. First, according to the college's personnel training, this study focused on only foreign language teaching and students' learning performance, specifically in one province in China. Future studies may incorporate further online-related teaching activities to better comprehend the behaviors of schools and students by conducting cross-model (online and offline) comparative research, such as comparing online teaching to offline teaching. Second, this study analyzed data from one university in China. Future researchers may collect further data from other universities in China or other countries on a larger scale to generalize the findings to China, Asia, Europe, or worldwide. Third, this study focused on a limited number of foreign language lessons. Future research may increase the lesson categories to generate more potential contributions in student settings. Fourth, owing to the complexity of the proposed model, this study did not investigate the impact of intervention activities (i.e., process, methods, tools, and environment) on students' preferences, emotions, and knowledge acquisition. Fifth, this study has not considered the difference of intervention methods, and it is unclear whether the difference can be popularized universally or has the characteristics of online teaching. Future research could investigate this further to reveal new insights in other universities in China, across Asia, or in other countries. Finally, this study employed student input and support as mediators. Future research may apply the student learning network to uncover insightful findings on student performance.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: Jiangxi University of Finance and Economics reserves the right to use the data. Requests to access these datasets should be directed to zou.yf@163.com.

Author contributions

XY: literature review and draft. ZY: literature review, draft, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Does language make people more prosocial? The influence of Mandarin proficiency on donation behavior

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Both the effects of language proficiency on individual outcomes, and the influencing factors of individual donation arouse wide concern, but researchers have hardly probed into the relationship between language proficiency and donation behavior. Using the data from the 2012 China General Social Survey (CGSS) and the binary logistic regression model as the benchmark model, this study empirically examines the influence and mechanism of language proficiency on donation behavior. It is revealed that Mandarin proficiency has significant positive influence on individual donation behavior. According to the results of the variable substitution practice and the instrumental variable regression based on the two-stage least square model, the above conclusion remains robust. The heterogeneity test shows that Mandarin proficiency of male, southern and rural residents has more obvious impact on donation behavior. The multiple intermediary effect test indicates that perceived social responsibility and subjective social status partially mediate the relationship between Mandarin proficiency and donation behavior. Therefore, it indicates that language proficiency has a prosocial effect, which makes people more prosocial. This study contributes to the literature on donation behavior by examining the influencing mechanism of Mandarin proficiency on individual donation, and further the effects of language proficiency on individual outcomes, thereby providing theoretical and empirical support for the formulation of policies for the promotion of Mandarin and social donation in China.

KEYWORDS

language, prosocial, Mandarin proficiency, donation behavior, perceived social responsibility, subjective social status

1. Introduction

Donation is a kind of prosocial behavior that refers to helping others without a defined goal and offering tangible or intangible property to specific organizations or individuals without asking for any return (Taute and McQuitty, 2015). Individual donation has always been an important factor in promoting social fairness and justice, maintaining social harmony and stability. The level of resident giving behavior is the cornerstone of charities and one of the key reflections of the harmonious evolution of society. China has been known as a "country of etiquette" with a fine tradition of showing benevolence and taking pleasure in helping others since ancient times. As the per capita income of Chinese people keeps growing and the national legal protection for individual donations is strengthened, the Chinese public has been involved in charities with increasing enthusiasm. According to the *2019 Charitable Donation Report of China*, China received 170.144 billion RMB in domestic and international donations in 2018, with individual donations accounting for 23.4% of the total donations and representing an increase of 10.54%. Even so, there is still a significant disparity between the degree of individual donation in China and those in Western nations. Therefore, it has become crucial to investigate the variables that may influence an individual's contribution behavior and then implement necessary changes to raise the donation rate of Chinese individuals' contributions.

From a social perspective, language plays a crucial role in the development and operation of human society. It has numerous advantageous characteristics and incorporates a wide variety of functions, such as communication, culture, and society. From an individual perspective, as a comprehensive manifestation of basic human abilities and qualities, language proficiency has a substantial impact on one's human capital, social capital, and cultural capital. There are consequently consequences on aspects such as the income spillover effect (Chiswick and Miller, 1995), health effect (Schachter et al., 2012), and happiness effect (Angelini et al., 2015). The majority of study to date has focused on how linguistic competence influences individuals' capacity for economic and social advancement. Researchers have hardly looked at how linguistic ability affects people's prosocial behavior, just like whether it improves the frequency of charitable giving. Furthermore, while there are lots of linguistics-based researches on the influencing factors of individual donations, researchers have rarely probed into the relationship between language proficiency and donation behavior. Given all this, using data from the 2012 China General Social Situation Survey, this study focuses on the influence and mechanism of language proficiency on individual donation behavior.

2. Literature review

2.1. Donation behavior

The fundamental characteristic of prosocial behavior is that the provider demonstrates prosocial qualities by putting others' needs ahead of his own interests. The development of society and the economy, as well as the growing awareness of social philanthropy, are all contributing to a steady increase in public donations. The government and all levels of society have taken notice of this (Halfpenny and Lowe, 1994). The factors that affect individual donation behavior have attracted the attention of many researchers on a global and local scale. Based on reviewing more than 500 related works, Bekkers and Wiepking (2010) has classified the factors and mechanisms influencing individual donation behavior into eight categories: awareness, donation information, costs and benefits, altruism, reputation, psychological consequences, values, and efficacy. In general, academic circles look at charitable giving from the perspective of individualism and structuralism. The structuralism viewpoint stresses how structural pressures in an individual's external environment, such as their family environment, organizational environment, social environment, and institutional environment, shape their donating behavior (Yen, 2002; Wiepking and Maas, 2009; Meer, 2011; Brown and Ferris, 2016). While individualism focuses on the intrinsic factors influencing donation behavior, In addition to demographic characteristics such as gender, education, and social and economic status (Andreoni and Vesterlund, 2001; Bénabou and Tirole, 2006), psychological factors such as selfishness and altruism (Glazer and Konrad, 1996; Vesterlund, 2006), sympathy (Clary and Snyder, 1991), regrets and guilt (Dawson, 1988) are all taken into consideration from an individualistic perspective, which emphasizes the inner role of donors. According to other academics, a person's donation does not entirely depend on good intentions or altruism, but also on resources such as material and time (Penner et al., 2005) as well as their ability and willingness to make donations (Korndorfer et al., 2015).

2.2. Language proficiency and prosocial behavior

As an integral part of human capital, language skills have a profound impact on individuals' economic and social lives. According to linguistic economics, languages proficiency is a vital part of human capital in the context of the economy (Chiswick and Miller, 2003). People with stronger language skills have more communication alternatives, are better able to make more money or have a higher quality of life (Gao and Smyth, 2011), and receive higher income or get better jobs (Chiswick and Miller, 1995; Lazear, 1999; Lawson and Sachdev, 2016). Language proficiency is integrally tied to a person's success in the labor market, including income levels, employment opportunities, and particular jobs (Dustmann, 1994; Chiswick and Miller, 1995). Language carries the dissemination of knowledge and the transfer of culture (Bourdieu and Passeron, 1990). Language as a social bond that brings different individuals together into a community and weave a social network (Zhao, 2013). People with high language proficiency are more concerned about social dynamics, participate in social activities, engage in public services and expand social interactions, which leads to a closer connection with society, thus reinforce the tendency to be more prosocial, and thus more likely to engage in prosocial behavioral activities such as donations (Lu et al., 2018). Developmental psychology research has shown that language ability is one of the indicators to gauge and predict prosocial behavior, and they also show a positive relationship between children's language capability and prosocial behavior (Cassidy et al., 2003). In summary, it can be inferred that those who have the greater linguistic ability are more likely to acquire greater survival or social skills, engage in more social interactions, have a stronger sense of social identity, and thus are more willing to make donations. As a result, the following research supposition is made in this study.

H1: Individual donation behavior is significantly increased by language proficiency.

2.3. Mechanisms: Altruism and reciprocity

The issue of why individuals choose to make donations is a topic that has long been of interest (Wispé, 1978). Different scholars have provided a wide range of opinions on the motivation of donation behavior and have constructed their own theoretical foundations, and the basic view is that the act of donating is altruistic, but also self-interested (Akerlof and Kranton, 2000; DellaVigna et al., 2012). We attribute human giving behavior to a combination of two main types of motivations: one is driven by other-oriented altruism, purely to meet the needs of others (Becker, 1974; Andreoni, 1989, 1990); the other is driven by self-oriented egoism, such as to gain a high social status, a good personal reputation, or the hope of reciprocity (Sugden, 1984; Glazer and Konrad, 1996; Bénabou and Tirole, 2006). In view of this classification, some factors are expected to moderate the relationship between language proficiency and donation behavior from the mechanism of altruism and reciprocity.

Altruism refers to a psychological motivation that focuses on the interests of others without considering one's own interests; it is a level of motivation that is voluntary and explicitly committed to helping others (Schlosser and Levy, 2016). One of the main manifestations of an individual's altruistic motivation is a sense of social responsibility, which is the tendency of individuals to voluntarily work for the prosperity of society and the common good of its members with the aim of altruism (Starrett, 1996). Perceived social responsibility is more of an internalized value, which individuals believe they have a responsibility to contribute to society and make it a better place to live. Thus, responsibility is a code of conduct that individuals adhere to for themselves, and individuals are driven to engage in prosocial behavior through their own sense of social responsibility. Therefore, perceived social responsibility is a crucial factor in predicting an individual's prosocial behavior (Berkowitz and Daniels, 1963), and the level of prosocial behavior of individuals depends on the amount of social responsibility activated by situational and individual factors (Schwartz, 1977). It has been shown that people who value social responsibility make more charitable donations (Schuyt et al., 2010). On the other hand, language serves as a social link and a system or convention throughout society (Zhao, 2013). Language plays a crucial role in the development of cultural identity, individual identity, and community. It also plays a crucial role in the web of meaning that people weave in their lives. People who share the same language come together to form an indivisible whole because of the social aspect of language, which states that "those who speak the same language have an intangible and strong attraction" (Fichte, 2008). Therefore, raising people's language proficiency can increase their desires to engage in society, foster interpersonal contacts, and strengthen perceived social responsibility, which is shown in their participation in charitable activities and public services (Lu et al., 2018). This suggests that having a strong command of a second language helps one build a larger social network, develop a stronger sense of civic duty, and become more willing to engage in and put into practice charitable activities. In light of this, this study suggests the following research hypothesis.

H2: Language proficiency has an impact on promoting one's donations through heightening their perceived social responsibility.

Social exchange theory and the reciprocity perspective suggest that people are more likely to engage in prosocial behaviors when they are rewarded or reciprocated by the recipient (Leimgruber, 2018). In other words, people are more likely to help others if the (potential) rewards of the relationship outweigh the costs/investment. In this context, helping others is often motivated by the expectation of establishing and maintaining a positive relationship with the target, and individuals tend to build/maintain relationships and promote interpersonal harmony. Thus, the individual tends to engage in prosocial behavior in order to get what he needs from others as well. For example, to following social norms, building a good self-image and win a high reputation are the motives that induce individual donation behavior (Sugden, 1984; Whillans and Dunn, 2018). Compared to lower class individuals, higher class individuals are more concerned about their reputation and group identity and have a greater desire for class (Belmi et al., 2020), so they are more likely to follow prosocial norms and produce more prosocial behavior. It can be inferred from this that in order to maintain their good image and enhance their reputation, individuals with higher subjective class identity are more likely to perform donation behaviors. On the other hand, sociolinguistics contends that language can reflect the social class of the speaker, that the speaker's response to particular linguistic variables is compatible with his socioeconomic class, and that there are glaring variations in language use across social classes. The language skills of children from wealthy families and those from lower-class families differ significantly (Bernstein and Henderson, 1969). Language changes correspond to changes in one's identity, and identity changes have a significant impact on one's attitudes toward languages and language use (Lawson and Sachdev, 2016). An individual's sense of class identification is strengthened by language proficiency, an essential component of cultural capital. It can be concluded that those who are more linguistically skilled are more likely to feel more strongly about their class, which makes them more likely to give to charity. Therefore, this study suggests the following research hypothesis.

H3: Language proficiency has an impact on promoting one's donations through enhancing their subjective social status.

2.4. Theoretical framework

Based on the above analysis, combining social identity theory, social norm theory, social exchange theory, the theoretical framework of this study is constructed (Figure 1). The framework explains how individuals' language proficiency affects their donation behavior. Specifically, language proficiency promotes ones' donation behavior, mainly through subjective social status and perceived social responsibility, which respectively stand for altruistic and reciprocal mechanisms.

3. Research method

3.1. Data sources

The 2012 China Comprehensive Social Status Survey (CGSS), which was carried out by the Renmin University of China in collaboration with academic institutions nationwide, provided the data for this study. The research is the country's first comprehensive, ongoing, and national academic survey project. It employs a multi-stage stratified random sampling design and gets data from 29 provinces, autonomous areas, and municipalities nationwide, which completely and methodically gathers data on social life, including politics, economics, and culture in China, and has a high validity, and whose data has been used in a great number of empirical research. It originates at the social, family, and individual levels. There are two volumes (Volume A and Volume B) to the CGSS2012 questionnaire. The variables needed for this study are included in Volume A's data, which also includes a total of 5,819 samples. 5,171 valid data were finally collected after the data had been cleaned up, and invalid and outlier data were deleted.

3.2. Description of variables

3.2.1. Dependent variable: Donation behavior

The dependent variable of this study is donation behavior. The variable is measured by asking the question, "In 2011, have you personally made a donation to society in the form of money, in kind, or ownership? In this context, we refer to donations that you have made to individuals or organizations in the community voluntarily and without the intention of receiving a donation back." We set the value of this variable to 1 for participating donations and to 0 for non-participating donations.

3.2.2. Key independent variable: Mandarin proficiency

The independent variable of this study is Mandarin proficiency. According to Zhang and Lien (2020), speaking is the key aspect of Mandarin competence. The variable is measured by asking the question, "What do you think of your ability to speak Mandarin?" measured on a 5-point Likert scale ranging from 1 (none) to 5 (Very well).

3.2.3. Mediating variables: Perceived social responsibility and subjective social status

The mediating variables include perceived social responsibility and subjective social status. The variable of perceived social responsibility is measured by asking the question, "To what extent do you agree with the statement that I want to make a contribution to society?" measured on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). According to Chen and Williams (2018), the variable of subjective social status is measured by asking the question, "In our society, some individuals belong to the upper class of society and some people belong to the lower class of society, which class do you think you are currently in?" We set the value of this variable to 1 for the lowest class and to 10 for the highest class.

3.2.4. Control variables

In terms of control variables, previous studies show that social capital has a significant effect on individuals' donations (Schervish et al., 1997; Mesch et al., 2006; Wang and Graddy, 2008; Brown and Ferris, 2016). However, those scholars' findings were inconsistent probably because of differences between Chinese and Western cultures or differences in the measurement of social capital. Therefore, we used social capital as a control variable and divided it into two dimensions, namely structural social capital and cognitive social capital (Uphoff, 2000). The variable of cognitive social structure is

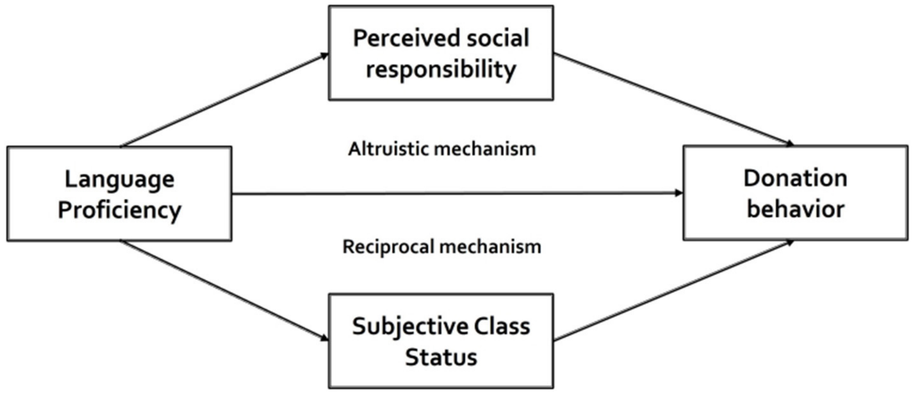

FIGURE 1
The theoretical framework.

measured by asking the question, "How often do you engage in social and recreational activities with your friends (for example, visiting each other, watching TV, having a meal, playing cards, etc.)" We set the value of this variable ranging from 1 (never) to 7 (almost every day). The variable of cognitive social structure is measured by asking the question, "In general, to what extent do you think most people can be trusted?" We set the value of this variable ranging from 1 (Dealing with most people almost always requires great care) to 4(Most people can almost always be trusted). According to the existing literature (Andreoni and Vesterlund, 2001; Bénabou and Tirole, 2006), we also considered demographic, economic, and social factors, and included control variables such as gender, age, marriage, ethnicity, religion, party membership, household registration, residence, years of education, and income levels, which are shown in the descriptive statistics in Table 1.

3.3. Model construction

Considering that the variables employed to measure donation behavior are binary dummy variables, this research primarily uses the binary logistic model to investigate the impact of language proficiency on donation behavior. The vector of these independent variables can be written as $x' = (x_1, x_2, \ldots, x_n)$, and the conditional generalization $P(Y = 1 \mid x) = p$ is a donation. Then its binary Logistics regression model can be expressed as:

$$\ln\left(\mathrm{x} = \frac{p}{1 - p}\right) = \beta_0 + \beta_1 \mathrm{x}_1 + \beta_2 \mathrm{x}_2 + \ldots \beta_n \mathrm{x}_n$$

β_0 is a constant and β_i is the coefficient of the variable of Mandarin proficiency and a series of control variables.

4. Empirical analyses

4.1. The influence of language proficiency on prosocial behaviors

4.1.1. Benchmark regression

Table 2 shows the binary logistic regression model of the influence of mandarin proficiency on donation. Model (1) is a single variable regression model, and model (2) controls the control variables that affect individuals' donations. The results show that in both model (1) and model (2), the coefficient of the influence of Mandarin proficiency is positive at the significance level of 1%, indicating that Mandarin proficiency has a significant impact on prompting an individual to make donations, that is, a respondent who has greater Mandarin proficiency is more likely to donate. After Model (2) has incorporated control variables, the absolute value of the marginal effect of the influence coefficient of Mandarin proficiency decreases slightly, but it is still positive at the significance level of 1%. It suggests that Mandarin proficiency has a significant impact on individual donations behavior after the variables such as gender, age, and social capital have been controlled.

In terms of the control variables, the regression coefficient of gender is significantly positive, indicating that males are more likely to donate than females. The age regression coefficient is significantly negative, indicating that an individual becomes less likely to donate as they grow older. The regression coefficient of marriage is significantly positive, indicating that married people are more likely to donate than unmarried people. People who have Han nationality are more likely to donate than ethnic minorities. Religious beliefs have a significant effect on donation, and those who hold religious beliefs are more likely to donate. Members of the Communist Party of China are more likely to donate than other groups. Residents who hold

TABLE 1 The method of variable measurement and the result of descriptive statistics ($N = 5,171$).

Variable	Definition	Mean	SD	Min	Max
Donation behavior	Donation = 1, non-donation = 0	0.33	0.470	0	1
Mandarin speaking	None = 1, bad = 2, moderate = 3, well = 4, very well = 5	3.09	1.208	1	5
Mandarin speaking	Great = 1, poor = 0	0.35	0.477	0	1
Gender	Male = 1, female = 0	0.51	0.500	0	1
Age	Age/100	48.27	16.082	16	93
Marriage	Married = 1, others = 0	0.81	0.395	0	1
Ethnicity	Han nationality = 1, others = 0	0.91	0.285	0	1
Religion	Have a religious belief = 1, have no religious belief = 0	0.86	0.343	0	1
Party membership	Member of the Chinese Communist Party = 1, non-party members = 0	0.12	0.331	0	1
Household registration	Resident committee = 1, village committee = 0	0.47	0.499	0	1
Residence	Urban = 1, rural = 0	0.55	0.497	0	1
Education	Never receive any education = 0, private or elementary school = 6, junior high school = 9, high school = 12, junior college = 15, bachelor = 16, graduate and above = 18	8.79	4.588	0	18
Ln (income)	Natural logarithm of personal income in 2011	3.74	1.251	0	7
Structural social capital	Frequency of social and recreational activities with friends (1–7)	4.07	1.935	1	7
Cognitive social capital	Level of trust most people (1–4)	2.97	0.614	1	4
Perceived Social Responsibility	Willingness to make a contribution to society (1–7)	5.36	1.192	1	7
Subjective social status	Self-perception of the social class (1–10)	4.17	1.688	1	10

urban household registration are more likely to donate than those who hold rural household registration. The regression coefficient of education is significantly positive, indicating that those who are well-educated are more likely to donate than those who are ill-educated. In terms of the economic factors, the influencing coefficient of the income logarithm is significantly positive, indicating that those who are well-paid are more likely to donate than those who are badly paid, which confirms the hypothesis about the relationship between resources and prosocial behaviors, that is, individuals on a higher income have more resources needed for the donation and, as a result, are more likely to make donations. In terms of social factors, different types of social capital have different effects on donation. Cognitive social capital has a significant and positive influence on individuals' donation, while structural social capital does not have a significant effect, suggesting that individuals' donation depends more on their subjective cognitive social capital rather than their objective structural social capital.

4.1.2. Robustness check

We used different research methods and the variable substitution practice to test the robustness of the effect that Mandarin proficiency has on donation. Firstly, Model (3) in Table 2 is the result obtained after we have set Mandarin proficiency as a dummy variable, assigned 1–3 as 0 and 4–5 as 1, and conducted the binary logistic regression analysis. The results are consistent with those of Model (2), that is, the coefficient of Mandarin proficiency is significantly positive. Therefore, we obtained the same results by using different research methods, that is, Mandarin proficiency has an impact on prompting individuals to make donations. It suggests that the effect of Mandarin speaking on individuals' donations is robust.

Secondly, as another important measure of Mandarin proficiency, listening can also represent individuals' proficiency in the language, so we replaced the independent variable Mandarin proficiency with another one, namely Mandarin listening proficiency, and conducted the binary logistic regression analysis again. The results of model (4) in Table 2 show that the coefficient of listening proficiency in Mandarin is still significantly positive and is still significant at the significance level of 1%. In other words, Mandarin listening also has a significant positive effect on individuals' donations and is also a predictor variable of individuals' donations. Significantly, the regression coefficient of Mandarin speaking is larger than that of Mandarin listening, indicating that the former has a greater impact on individuals' donations than the latter. It is because, compared to listening proficiency, Mandarin

TABLE 2 Effect of Mandarin proficiency on donation behavior: Baseline regression ($N = 5,171$).

Variables	1	2	3	4
Mandarin speaking	0.414*** (0.026)	0.171*** (0.031)	0.256*** (0.070)	
Mandarin listening				0.170*** (0.035)
Gender		0.239*** (0.067)	0.242*** (0.067)	0.249*** (0.067)
Age		−0.012*** (0.002)	−0.013*** (0.002)	−0.012*** (0.002)
Marriage		−0.250** (0.084)	−0.258** (0.084)	−0.240** (0.084)
Ethnicity		0.328** (0.113)	0.317** (0.113)	0.360** (0.114)
Religion		0.478*** (0.093)	0.468*** (0.093)	0.474*** (0.093)
Party membership		−0.551*** (0.099)	−0.547*** (0.098)	−0.551*** (0.098)
Household registration		−0.202* (0.088)	−0.219* (0.088)	−0.211* (0.088)
Residence		−0.269** (0.085)	−0.293*** (0.085)	−0.287*** (0.085)
Education		0.077*** (0.011)	0.085*** (0.011)	0.081*** (0.011)
ln (income)		0.073** (0.028)	0.077** (0.028)	0.076** (0.028)
Structural social capital		−0.001 (0.017)	0.002 (0.017)	0.000 (0.017)
Cognitive social capital		0.149** (0.052)	0.151** (0.052)	0.148** (0.052)
Constant	−2.028*** (0.091)	−1.611*** (0.322)	−1.194*** (0.310)	−1.742*** (0.334)
Nagelkerke R^2	0.071	0.161	0.157	0.159
Observed values	5,171	5,171	5,171	5,171

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Standard errors are in parenthesis.

speaking proficiency plays a greater role in daily life, workplaces, and social interactions. Those who show greater Mandarin speaking proficiency are more proactive in social interactions, more likely to obtain various resources, and thus more likely to donate.

4.1.3. Endogenous analysis

In the baseline regression, we, by using the logistic model, have found that there is a positive relationship between Mandarin proficiency and individuals' donation, and the finding did not change after a series of robustness checks. However, the logistic estimation was not sufficient to prove that there is a necessary causal relationship between them, so we needed to further resolve the endogenous problems caused by the omission of variables, measurement errors, and reciprocal causality. Therefore, we used instrumental variables and two-order least squares (2SLS) for further tests. Imitating the methods used by Zhang and Cheng (2022), we used the frequency of newspaper use and the average level of people's Mandarin proficiency in one city as instrumental variables. First, since only standard Mandarin is available in the newspapers, frequently reading newspapers may have a positive effect on people's Mandarin proficiency, can enlarge their vocabulary, and thus increase their speaking proficiency. Therefore, the frequency of newspaper use indicates respondents' mastery of standard Mandarin, and we used it as the first instrumental variable in this study. Second, languages vary from region to region, and the average level of respondents' Mandarin proficiency in one city can reflect their true language proficiency but is not

TABLE 3 Effect of language proficiency on donation behavior: endogenous analysis/instrumental variable method ($N = 5{,}171$).

Variable name	Donation behavior	
	The first-stage regression analysis	The second-stage regression analysis
Mandarin proficiency		0.033***(0.006)
Newspaper use	0.076***(0.012)	
Mandarin proficiency of other people in the same city	0.669***(0.017)	
Control variable	Yes	Yes
F test	334.013	51.685
Observed value	5,171	5,171

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Standard errors are in parenthesis.

related to their donation. Therefore, the average level of other peoples' Mandarin proficiency in the same city (excluding the respondents) is used as the second instrumental variable in our study.

The results of the data analysis (see Table 3) show that, when the variables such as other demographic variables, income levels, and social capital have been controlled, the regression coefficients of the effect of Mandarin proficiency on the frequency of newspaper use and the average level of Mandarin proficiency of other people in the same city are 0.076 and 0.699 respectively in the first-stage regression analysis, indicating that the frequency and the average level have a significant and positive effect on individuals' Mandarin proficiency, and both are significant at the 1% level. Therefore, newspaper use and Mandarin proficiency of other people in the same city are valid instrumental variables, and the latter is a more powerful instrumental variable. The results of the second-stage regression analysis show that after controlling potential endogenous problems in the model, Mandarin proficiency still has a positive effect on donation and is significant at the 1% level, indicating that Mandarin proficiency has a significant impact on promoting individuals' donation.

4.1.4. Heterogeneity analysis

Given that the effect of Mandarin proficiency on donation varies from group to group, we conducted grouped logistic regression analysis of the samples from the perspectives of gender, town and country, and region. The results are shown in Table 4. Firstly, existing studies show that there are differences between men and women in terms of language learning and language proficiency (Newman et al., 2008; Coates, 2015), and the differences may lead to variations in the effects of Mandarin proficiency on donation. Therefore, we grouped the samples according to gender to examine the differences in the effect of Mandarin proficiency on male and female residents' donations. Model (5) and Model (6) are the results of the regression analysis of the effect of Mandarin proficiency on male and female residents' donation respectively. The results of data analysis show that although the significance of the regression coefficients of each equation decreases compared to the results in Table 2, they are still significant at the 5% level, indicating that Mandarin proficiency has a significant effect on both male and female residents' donations. In terms of the regression coefficients, the coefficients of males are larger than those of females, in other words, Mandarin proficiency has more obvious impact on promoting male residents' donation. It is probably because, compared with female residents, the odds are greater that Mandarin proficiency will become a barrier to male residents participating in social activities, and consequently to reduce the chance of participating donations.

Secondly, there are obvious barriers and different levels of social and economic development between urban and rural areas in China, causing different popularity of Mandarin in both areas. Therefore, differences between urban and rural residents in terms of Mandarin proficiency may lead to different impacts that Mandarin proficiency has on donation. Therefore, we grouped the samples according to urban and rural areas to examine the differences in the effects of Mandarin proficiency on urban and rural residents' donations. Models (7) and (8) show the results of regression analysis of the effect of Mandarin proficiency on urban and rural residents' donations. The results of the data analysis show that rural residents' Mandarin proficiency has a greater positive effect on their donation than urban residents. It is because rural residents' Mandarin proficiency is significantly lower than urban residents, which inhibits their productive capacity and ability to live. Therefore, increasing rural residents' Mandarin proficiency can make them more likely to donate.

Finally, China is a vast country, and there is a big difference between north China and south China in terms of language use. The differences between southern and northern residents in terms of their Mandarin proficiency may lead to differences in the effects of Mandarin proficiency on donation. Therefore, we grouped the samples according to regions, used the Qinling Mountains and Huai River as the boundary between north China and south China, and examined the effect that Mandarin proficiency has on the donation of southern and northern residents. The results of the data analysis show that the coefficient of Mandarin proficiency of southern residents is larger than that of northern residents, and has a greater positive effect on their donation. It is because there is a significant difference in language between the north and the south of China. Southern residents have difficulty in speaking Mandarin, so it will inhibit them from communicating and adapting to the changing environment and has a negative effect on their donation behavior.

TABLE 4 Effects of Mandarin proficiency on donation behavior after grouping ($N = 5,171$).

Variable name	5	6	7	8	9	10
	Male	Female	Urban	Rural	Northern	Southern
Mandarin proficiency	0.099*** (0.099)	0.068** (0.009)	0.047* (0.009)	0.124*** (0.008)	0.046* (0.009)	0.101*** (0.009)
The first-stage estimation−Mandarin speaking						
Newspaper use	0.075*** (0.016)	0.092*** (0.018)	0.070*** (0.014)	0.100*** (0.022)	0.045* (0.018)	0.135*** (0.015)
Mandarin proficiency of other people in the same city	0.426*** (0.024)	0.428*** (0.025)	0.428*** (0.022)	0.437*** (0.028)	0.543*** (0.025)	0.215*** (0.028)
Control variable	yes	yes	yes	yes	yes	yes
F test	29.146	28.327	22.966	18.375	21.703	30.804
Observed value	2,653	2,518	2,864	2,307	2,366	2,805

***p < 0.01, **p < 0.05, *p < 0.10. Standard errors are in parenthesis.

4.2. The mechanism by which language proficiency affects prosocial behaviors

Based on the discussion in the theoretical section, we have investigated the mechanism by which reading affects prosocial behaviors. We selected perceived social responsibility and subjective social status as mediator variables and used the bias-corrected percentile Bootstrap to test the intermediary effects. In terms of testing tools and working methods, we used the SPSS macro-PROCESS plug-in. Model (4) is chosen. We, after controlling relevant variables such as demographics, economic factors, and social capital, have tested the intermediary effects of perceived social responsibility and subjective social status on language proficiency and donation, respectively.

As shown in Table 5, the results of the regression analysis show that Mandarin proficiency has a positive and significant effect on perceived social responsibility and subjective social status, and perceived social responsibility and subjective social status also have a positive and significant effect on donation statistically. The results of 5,000 Bootstrap sampling tests (95% confidence interval) show that Mandarin proficiency has a direct effect on donation (Effect = 0.160, SE = 0.032, LLCI = 0.098, ULCI = 0.222), and the confidence interval of indirect effects of perceived social responsibility (Effect = 0.008, SE = 0.003, LLCI = 0.002, ULCI = 0.015) and subjective social status (Effect = 0.004, SE = 0.002, LLCI = 0.001, ULCI = 0.009) do not contain 0. It suggests that both perceived social responsibility and subjective social status exert partial intermediary effects on Mandarin proficiency and donation (see Table 5). In other words, not only does Mandarin proficiency have a direct effect on individuals' donation behavior, but it also has an indirect effect on donation behavior through the mediation of perceived social responsibility and subjective social status.

In terms of direct effects, the results of data analysis show that Mandarin proficiency has a significant and positive effect on perceived social responsibility and subjective social status, that is, greater Mandarin proficiency makes people feel a stronger sense of perceived social responsibility and subjective social status. On the one hand, language, as a kind of human capital and social capital, is an important part of individuals' abilities and endowment. As the old saying goes, "those who have the greater ability should shoulder greater responsibility". Therefore, language will heighten individuals' sense of perceived social responsibility; on the other hand, language, as a kind of cultural capital, is an important condition for individuals to be recognized by the upper class, and language proficiency helps to heighten their sense of subjective social status. In addition, both perceived social responsibility and subjective social status have a significant and positive effect on individuals' donations. Those who feel a stronger sense of perceived social responsibility are more likely to make donations. It is because perceived social responsibility, as a set of internalized values, is closely related to prosocial behaviors, and as a person believes that he has the greater responsibility to make contributions to society, they will more likely to make donations. Subjective social status has a significant and positive effect on donation. As an individual rates their social class more highly, they will more likely to make donations. It is probably because individuals who have a stronger sense of subjective social status will be more satisfied with their lives, believing in the idea of "those who get ahead in their careers should make contributions to society", and, as a result, will be more likely to make donations.

5. Research discussion

5.1. Conclusions

Language proficiency is a fundamental skill that everyone must possess and is crucial to day-to-day living. The greater

TABLE 5 The influencing mechanism of Mandarin proficiency on donation behavior ($N = 5{,}171$).

Effect	BC 95% CI				
Direct Effect	Estimate	S.E.	p	LLCI	ULCI
Mandarin proficiency–donation behavior	0.160	0.032	0.000	0.098	0.222
Mandarin proficiency–perceived social responsibility	0.044	0.016	0.007	0.012	0.076
Mandarin proficiency–subjective social status	0.068	0.0230	0.003	0.023	0.113
Perceived social responsibility–donation behavior	0.182	0.028	0.000	0.126	0.237
Subjective social status–donation behavior	0.058	0.019	0.003	0.020	0.096
Total indirect effect	0.012	0.004	—	0.005	0.020
Mandarin proficiency–perceived social responsibility–donation behavior	0.008	0.003	—	0.002	0.015
Mandarin proficiency–subjective social status -donation behavior	0.004	0.002	—	0.001	0.009

All of the control variables were controlled.

a person's language proficiency is, the simpler it may be for them to establish a larger feeling of social duty and subjective social status, which makes it simpler for them to engage in and carry out prosocial actions like giving. The relationship between language ability and charitable conduct has not yet developed a systematic and clear cognition, and it is unclear whether language can make individuals prosocial or whether language skill has a prosocial effect. Based on the 2012 CGSS data, this study thoroughly used benchmark regression (binary logistic regression), robustness test, endogeneity test, heterogeneity analysis, and mediation effect test to empirically investigate the influence and mechanism of Mandarin proficiency on donation behavior among residents in China. The following conclusions are made.

First, the benchmark regression results showed that Mandarin proficiency can significantly promote individuals' donation behavior. Even after controlling for gender, age, education level, social capital and other factors, language proficiency still has a significant impact on donation behavior. Both Mandarin speaking and listening considerably increase the level of individual donating behavior. The outcomes of the instrumental variable regression test demonstrate a significant impact of Mandarin proficiency on a person's willingness to give. This finding suggests that in addition to benefiting individuals themselves by helping to increase personal income and enhance subjective well-being, language proficiency has a significant prosocial effect by making people more prosocial and promoting individual levels of giving behavior. Mandarin is a tool for everyday communication among Chinese residents. The stronger an individual's Mandarin ability, the more likely he or she is to interact with others, and the stronger his or her ties to society, the more likely he or she is to develop prosocial tendencies and thus more likely to implement donation activities.

Second, the heterogeneity test revealed the differential effects of language ability on donation behavior across resident groups. Mandarin proficiency of male, southern and rural residents has more obvious impact on donation behavior. This is because compared with female, urban and northern residents, male, rural and southern residents have a lower level of Mandarin, and their difficulty in accurately listening and fluently speaking of Mandarin restricts their daily communication and social integration, which is not conducive to the formation of prosocial tendencies. Therefore, the language barrier has a more significant inhibitory effect on their donation behavior.

Finally, perceived social responsibility and subjective social status play a partially mediating effect between people's language proficiency and donation behavior, i.e., language proficiency not only contribute to people's donation behavior directly, but also can indirectly contribute to donation behavior by reinforcing perceived social responsibility and enhancing subjective social status. It can be seen that the mediating effect of language proficiency on donation behavior is through two mechanisms: altruistic mechanism is that language proficiency promotes donation behavior through perceived social responsibility; reciprocal mechanism is that language proficiency promotes donation behavior through subjective social status.

5.2. Theoretical implications

This study makes certain academic contributions and application value. From the standpoint of linguistics, this research offers a fresh analysis of the influence of Mandarin proficiency on an individual's donation behavior. It also investigates the mechanism and means by which Mandarin proficiency affects individual donation behavior using the mediation effect test. New theoretical foundations and concepts for the sociology of language are also provided by the literature that supplements behavior research.

Firstly, it broadens the newly created discipline of linguistic sociological research. This study adopts a novel strategy, starting from the viewpoint of a prosocial theory and extending the research on the consequences of language competence. Previous studies largely concentrated on the economic benefits and health effects of language on individuals (Dustmann and Fabbri, 2003; Tam and Page, 2016). The field and study subjects for the sociology of language research are expanded by accumulating the prosocial impact of language ability and concentrating on the influence of language ability on individual donation behavior at the level of the social importance of individual behavior.

Secondly, it broadens the study outlook on the variables that influence donating behavior. Past studies have produced a plethora of empirical studies to explain the influencing variables of individual donation behavior, including demographic traits, psychological qualities, and external environment, from the two views of individualism and structuralism. The ability endowment elements that influence individual donation behavior have, however, received little attention in the literature. Individual ability, such as linguistic skill, is a critical motivator for individuals to adopt long-term donation behavior.

Finally, this study examines the impact of language proficiency on donation behavior and its specific pathways. It deepens the research on the mechanism of individual donation behavior and enriches the theoretical research system of donation behavior. On the one hand, from the theoretical perspectives of altruism and reciprocity, this study has constructed the mixed mediating mechanism of perceived social responsibility and subjective class identification in language proficiency and donation behavior. On the other hand, Ability-motive Model provides a new perspective for the dynamic meaning construction of donation behavior, language ability promotes the explanatory path of donation behavior by strengthening the prosocial motives of perceived social responsibility and subjective class identity. The theoretical model of language proficiency-prosocial motives-donation behavior is constructed.

5.3. Practical implications

Practically speaking, the findings of this study not only offer a stronger foundation for promoting and popularizing Mandarin and for bolstering the development of national language skills, but also offer a new point of reference for interventions to raise the level of public donation behavior.

Firstly, Mandarin proficiency has a significant prosocial impact and both direct and indirect effects on an individual's donating behavior. It is clear that increasing national common language education, raising the quantity and quality of national common language popularization, fostering a positive linguistic climate, and boosting national language institutional capacity are all effective approaches to raising public donations. To achieve this, high-quality national common language enhancement should be applied at all levels and types of schools. At the same time, we should focus on the use of new media and integrated media, strengthen the impact of missionary education through technological empowerment, encourage the development of language and culture at various levels of society, and strengthen the national language. Increased cultural knowledge and proficiency in the mother tongue.

Secondly, it's essential to take into account the characteristics of donating behavior as well as the Mandarin proficiency of various groups. The impacts of Mandarin proficiency on willingness to donate also have different effects in different groups. This needs to optimize the Mandarin learning plans and pathways, boost the usefulness of the Mandarin effect, and maximize the prosocial effect of language ability.

Finally, in addition to the direct prosocial effect, the ability to speak Mandarin will also significantly strengthen people's sense of perceived social responsibility and improve their subjective social status, which is both crucial for maintaining national unity and realizing the peaceful and stable development of the nation and society. Moreover, the results of the control variables analysis have also provided a new perspective to prompt people to make donations. On the one hand, many factors such as demography, economy, and society have an effect on individuals' acts of charitable giving, which means that prompting citizens to donate is a systematic project, and the government needs to develop relevant policies to encourage people to do so.

5.4. Limitations

This study still has certain flaws because of the limits of secondary data indicators, even though the direct use of CGSS data can make the survey sample accurately reflect the entire population. To start with, language ability is a complicated idea. It also includes measuring its dimensionality and the language's substance. Language proficiency and donation behavior cannot be thoroughly multidimensionally analyzed in this study. Additionally, this study only has looked at the relationship between Mandarin competence and donation behavior; it did not look at dialect or foreign language proficiency, which are important markers of a person's level of ability in a particular language. Therefore, future research can provide a comparative analysis viewpoint to evaluate and examine the influence mechanism of various types and levels of language abilities on various types of donation behaviors from a more subdivided dimension.

Secondly, individuals' Mandarin proficiency and donation behavior may change as time goes by and technology develops, the CGSS2012 has measured these two variables. Although there is no denying that the findings have provided a guideline for us to think about the effect of linguistic ability on donation, it is necessary to be cautious when generalizing its conclusions since the data was collected long ago. To determine whether a linguistic ability's effect on contribution behavior is consistent over time, further study will need to update the survey data. In addition, future studies can also compare and contrast the variables between linguistic proficiency and donation behavior in other circumstances employing samples of individuals from other regions and countries.

Finally, the study only has explored the mediating effects of perceived social responsibility and subjective social status because it had a limited number of variables to work with, and the proportion of mediating effects was low. However, there may be multiple mediating variables between language ability and donation behavior. Research on the prosocial effect mechanism of language ability can be improved by incorporating more and more significant mediating and moderating variables in the future. This will further enhance the unique influence of language ability on donation behavior.

Data availability statement

Publicly available datasets were analyzed in this study. The datasets for this study can be found in the Chinese General Social Survey (CGSS) (http://cgss.ruc.edu.cn/). Please see: http://cgss.ruc.edu.cn/ for more details.

Author contributions

QW wrote the literature review and performed the statistical analysis. LY performed and organized the theoretical background and completed the manuscript. RZ developed research hypotheses and revised the overall manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Why scapegoating can ruin an apology: The mediated-moderation model of appropriate crisis response messages in the context of South Korea

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Introduction: As South Korean companies frequently use apologies for various crisis situations and pair them with other types of crisis response strategies (i.e., scapegoating), theory-driven recommendations for crisis response messages may fall short in practice. This study empirically examines the effectiveness of two crisis response messages (i.e., apology + compensation vs. apology + scapegoating) by integrating the theory of communicative responsibility and situational crisis communication theory.

Methods: South Korean participants ($n = 392$) read one of two vignettes: the vignettes described an automobile company's apology for malfunctioning seat belts which included either compensation or scapegoating. The participant's perceived communicative responsibility, appropriateness of the apology, and reputation of the company were measured. Process analysis was conducted to examine the mediated-moderation effect of the crisis response messages.

Results and Discussion: The findings indicate that an apology that is provided with compensation is more appropriate than those with scapegoating. The appropriateness is moderated by the perceived symmetry in communicative responsibility, and fully mediates the relationship between apology type and reputation. This study integrates two theoretical models to examine the mechanism behind the crisis response strategies from the perspective of the message receivers, while considering the cultural and normative context of South Korea.

KEYWORDS

apology, communicative responsibility, crisis communication, process analysis, scapegoating, South Korea

Introduction

A crisis is an unpredictable threat to stakeholders, which affects an organization's reputation and performance. To advance an effective response to a crisis, Situational Crisis Communication Theory (SCCT; Coombs and Holladay, 2002; Coombs, 2007a) recommends the organizations to first evaluate the crisis, understand their responsibility for the crisis, and then devise a response accordingly. For instance, the theory recommends the organization to use apologies when it is highly responsible for the crisis (Choi and Chung, 2013; Ma and Zhan, 2016). Although the theory provides a framework that can be applied to better understand the nature of different crisis situations, the theory-driven recommendation may fall short in practice when the cultural and normative factors, as well as the variations within the content of a crisis response message are overlooked.

In South Korea, organizations use apologies inconsistently with SCCT. First, organizations frequently included apologies in their crisis response messages regardless of the nature of the crisis (Park and Ha, 2014). It is normative for South Koreans to apologize to the listener even when the listener has wronged them (Barnlund and Yoshioka, 1990; Lee and Park, 2011). Additionally, Koreans are likely to evaluate apologies more positively and emulate others' apologies (Park et al., 2005; An et al., 2010). Therefore, when the consumers of a company positively evaluate its apology, other companies may subsequently model the message, giving rise to the prevalent amount of apologies used by South Korean companies.

Second, apologies vary in their content. According to SCCT, an apology needs to ask for forgiveness, express regret, show concern, reassure the prevention of a future crisis, and fully accept responsibility for the current crisis (Coombs et al., 2010). However, organizations may attempt to shift the blame and avoid compensating the victims of the crisis while apologizing (Dulaney and Gunn, 2018). The organizations attempt to take advantage of what the word 'sorry' may imply, while excluding any explicit acknowledgement of the crisis responsibility. The content of crisis response messages, especially apology, also intertwines with the cultural context: South Korean companies are less likely to give excuses compared to American companies but are more likely to provide compensation along with their apologies (Kim and Lee, 2021).

In addition to the discrepancy in theory and practice, SCCT falls short in explaining why certain crisis response messages are effective from the perspective of consumer psychology. According to the theory of communicative responsibility (CRT; Aune et al., 2005), consumers expect the company to have the responsibility for helping them understand the crisis situation. They will be unsatisfied with the crisis response message when it does not provide enough explanation and information about the crisis to the extent that they expect. Therefore, there are two different responsibilities a company has at the time of a crisis: responsibility for the crisis and responsibility for informing the consumers about the crisis.

This study examined the effect of an apology by surveying 392 Koreans using a set of validated vignettes. Following the blueprints of SCCT, the study hypothesized that the perceived appropriateness of the apology mediates the relationship between the types of apology (i.e., an apology with scapegoating vs. an apology with financial compensation) and the consumer's perception of the company's reputation. According to CRT, the perceived appropriateness of apologies will vary depending on how much the consumers expect the company to be responsible for informing them about the crisis. The mediated-moderation effect is tested using the process analysis (Hayes, 2018). From this study, we aim to stretch the boundaries of SCCT by (a) investigating crisis communication in a non-Western culture, (b) examining the variations and complexities in apologies, and (c) integrating CRT and SCCT to better understand the psychological state of the consumers, who are the receivers of the crisis response messages from the company.

SCCT

SCCT, proposed by Coombs (2000), is a widely-used theoretical framework in crisis communication literature (Nwogwugwu, 2018). It explains which crisis response strategy is effective for restoring the organization's reputation that was damaged from the crisis (Coombs and Holladay, 2002). The theory categorizes crises into one of three clusters depending on the level of the organization's responsibility (Coombs, 2007b). The organization is less accountable for a victim crisis (e.g., natural disasters, rumors, and product tampering) as the crisis was unexpected, unforeseeable, and unintended. The organization is moderately responsible for an accidental crisis, which includes a product malfunction due to a technical error. When the organization is highly responsible for a crisis, it is categorized as a preventable crisis. For instance, organizational misdeeds, management misconduct, and human-lead recalls and breakdowns happen as a direct consequence of the organization's actions and choices. The meta-analysis conducted by Ma and Zhan (2016) empirically validates these three crisis types: the reputation of a company decreases as it is more responsible for a crisis ($r = -0.54$).

To mitigate the negative impact of a crisis, SCCT recommends the organization to formulate appropriate crisis response strategies (Coombs, 2006, 2007a). The organizations should use response strategies that convey more acceptance of the crisis responsibility and concern for stakeholders when it is more responsible for the crisis (Coombs and Holladay, 2005). Like the three types of crises, the theory categorizes response strategies into three groups. Deny strategy (which is appropriate for the victim crisis) expresses the least amount of consideration and acceptance. The organization uses the deny strategy, such as attacking the accuser and blaming another party for the crisis (i.e., scapegoating), to reduce the attributed crisis responsibility (Coombs, 2007a). This strategy conveys the organization's defensive position. Compared to the deny strategy, the diminish strategy (which is appropriate for the accidental crisis) conveys a moderate amount of concern and acceptance by arguing that the crisis was uncontrollable, or its damage is not as detrimental as it seems (e.g., giving excuses for the crisis; Coombs, 2007b). The rebuilding strategy (which is appropriate for the preventable crisis) provides materials and symbolic forms of aid to the crisis victims. For example, the organization may take full responsibility for a crisis by giving compensation and a sincere apology. Ma and Zhan's meta-analysis (2016) found that response strategies were more effective when they were used consistently with the SCCT recommendation ($r = 0.23$).

Cultural context of South Korea

Despite the popularity and usefulness of SCCT, its application to a wider, non-Western, global context is often overlooked (Coombs et al., 2010; Coombs and Laufer, 2018; Nwogwugwu, 2018). The effectiveness of certain response strategies as recommended by SCCT may vary across cultures due to the communicative norms (Guan et al., 2009; Lee and Park, 2011). In South Korea, it is normative for companies to frequently use apologies and in conjunction with other crisis response strategies.

Although SCCT recommends organizations to apologize for a preventable crisis, South Korean companies predominantly use apologies regardless of the crisis type (Park and Ha, 2014; Kim and Lee, 2021). This is consistent with how East Asians apologize more often than Westerners in a face-threatening situation (Barnlund and Yoshioka, 1990; Park et al., 2005; Lee and Park, 2011) and crisis communication (Kim and Lee, 2021). For instance, South Korean companies may apologize for creating a disturbance and inconvenience even when they are not fully responsible for the crisis (Lim, 2020). Additionally, South Koreans tend to emulate others' apologies more often than Americans (Park et al., 2005). Consequently, South Korean consumers are likely to expect an apology. Empirical evidence shows that apologies are highly effective in South Korea (Yoon and Choi, 2008; An et al., 2010). In other words, South Korean consumers may positively evaluate an apology, as it is consistent with their expectation, which reinforces other companies to model what worked previously.

Although crisis response strategies can be categorized into three groups, companies use them in combination (Kim et al., 2009). South Korean companies often combine apologies (i.e., saying 'sorry') with other crisis response strategies, even those from deny and diminish strategies (Yoon and Choi, 2008; Park and Ha, 2014; Lim, 2020). Kim and Yang (2012) content analysis of actual crisis response strategies used by South Korean organizations found that close to half of the apologies were insincere: the apologies included a justification of the crisis, appealed to sympathy, and excluded plans for corrective actions. Similarly, Kim and Lee (2021) analyzed 8 years of apologies used by South Korean and American organizations regarding cybersecurity breach. South Korean companies were more likely to include excuses, admittance of crisis responsibility, and display of concern and sympathy in their apologies. They were less likely to provide compensation and analytic accounts of the crisis compared to American companies. Lim (2020) also found that South Korean companies attack the accuser while apologizing for the crisis.

To better understand the effectiveness of crisis response messages that include apologies (which are prevalent yet diverse in South Korea), this study focuses on comparing two kinds of messages: one that includes an apology and a compensation, and the other that includes an apology and scapegoating. As the former includes two rebuilding strategies, it will be referred to as an accommodative apology (for simplicity). The latter will be referred to as a deny apology because scapegoating is an example of a deny strategy. The accommodative apology is more likely to convey a higher level of acceptance of crisis responsibility than the deny apology. An apology (i.e., saying sorry) conveys or at least implies acceptance of crisis responsibility, which can be enhanced when followed by compensation but reduced when followed by scapegoating. This is because both apology and compensation are rebuilding strategies according to SCCT (Coombs, 2010). As rebuilding strategies convey higher crisis responsibility compared to other types of response strategies, using two of them provides consistency in the message. Additionally, the compensation corroborates the sincerity of the apology. The accommodative apology shows the company's willingness to own up to its faults and provide resolutions as it is willing to incur the financial burden of providing compensation (Coombs, 2006; Coombs and Holladay, 2008; Coombs et al., 2010). Consequently, accommodative apologies are likely to be perceived as sincere as it attempts to repair the relationship with the consumers (Bentley, 2018).

Compared to accommodative apologies, deny apologies convey less acknowledgement of crisis responsibility. While an apology shows (or at least implies) that the company is aware of its responsibility for the crisis, scapegoating discredits the accountability. Although the company is saying 'sorry,' it attempts to avoid taking responsibility for the crisis by attributing the crisis to a third party (Kim et al., 2004; Waller, 2007; Eisinger, 2011; Bentley, 2015). The authenticity of these apologies is easily questioned, making the consumers consider the company to be deceptive and manipulative (Compton, 2016). Therefore, deny apologies are less effective in reducing the public's anger and negative sentiment (Lee and Chung, 2012).

Although the difference between accommodative and deny apologies is clear, companies still may have a difficult time deciding which apologies to use. As an accommodative apology demonstrates that the company is responsible for the crisis, it may have to handle financial repercussions for the crisis. Additionally, the company's words may be used in lawsuits as justifications for why the company should compensate the victims (Patel and Reinsch, 2003). On the other hand, deny apologies leaves room for various interpretations of the company's acknowledgment of the crisis responsibility (Pace et al., 2010). This enables the company to avoid the blame of the crisis while assuaging the consumers (to a certain extent) by apologizing (at least on the surface) for what has happened (Kim and Lee, 2021). When the crisis is detrimentally severe, an accommodative apology may be counterproductive; it provides self-supporting evidence that the company deserves punishment and blame for the crisis, which can further increase the perceived responsibility of the company (Schlenker, 1980; Sigal et al., 1988; O'Hara and Yarn, 2002). Therefore, scrutinizing which of the two apologies is more appropriate for whom in what situation enables the companies to make a more informed decision.

Understanding appropriateness of apologies

When a company creates an apology for its consumers, the value and utility of the message depend on the perception of the receivers. Assuming that certain crisis response strategies are effective in restoring the damaged reputation because the company's responsibility for the crisis matches the level of concern they express overlooks (1) the communicative process of sense-making, (2) the role of the message receiver in a communication, and (3) the mechanism that explains the effectiveness. The following elaborates on what it means for an apology to be appropriate, how it relates to restoring the damaged reputation, and how CRT helps us better understand the mechanism of appropriate apologies.

The appropriateness of an apology refers to the consumer's perception of how well the company communicated to remedy the relationship with the consumer, which may have been damaged by the crisis. More specifically, SCCT literature suggests that the appropriateness of an apology comprises the consumer's perception of its acceptability, sincerity, and effectiveness. First, the consumers are likely to accept apologies that they are satisfied with. In previous research (e.g., Coombs and Holladay, 2012; Bentley, 2018), appropriateness was operationalized as the consumer's perceived acceptability of the apology. Second, the perceived sincerity of the apology is positively related to the appropriateness (e.g., Choi and Chung, 2013; Ebesu Hubbard et al., 2013; Lwin et al., 2017). Third, the effectiveness refers to how well the apology is anticipated to reduce the reputational damage of the company (Choi and Chung, 2013) or increase the stakeholder's purchase intention (Lwin et al., 2017). As one of the goals of the apology is to yield a favorable evaluation and behavior from the consumer, the perceived effectiveness is the other pivotal aspect of the appropriateness. Considering the difference between the two apology types as mentioned above, the accommodative apology will be more appropriate than the deny apology.

The perceived appropriateness of the apology is positively related to the company's reputation. Because a crisis directly and indirectly affects the product and services of the company, it negatively affects the consumer's evaluation of the company (Dutta and Pullig, 2011). The consumer's evaluation will remain negative unless there is evidence to believe otherwise. Crisis response messages are opportunities for companies to persuade consumers to rethink their evaluation. Therefore, companies can restore the damaged reputation by providing an apology that is appropriate (Choi and Chung, 2013). To examine the effect of apology type on the consumer's perceived appropriateness and, consequently, on the company's reputation, the following hypotheses are advanced and a research question is asked.

> *H1*: The South Korean consumers will perceive the accommodative apology to be more appropriate than the deny apology.
>
> *H2*: As the perceived appropriateness of the apology increases, the South Korean consumers will perceive the company's overall reputation to be more positive.
>
> RQ1: Will the apology type have a direct effect on the South Korean consumer's perception of the company's reputation above and beyond the mediation of appropriateness?

CRT

Although apologies are inherently communicative acts, the communication between companies and consumers is seldomly examined from the perspective of meaning-making and sense-making (Weder et al., 2019). In this study, we use CRT as the theoretical framework to better situate SCCT in the context of communication. CRT illustrates how communicative parties (i.e., companies and consumers) make a judgment about how much responsibility each of them bears to create a mutual understanding (Aune et al., 2005). From Grice (1989) perspective, the goal of communication is to establish a shared understanding and knowledge. In other words, when communicating, people have the responsibility and commitment to engage in collaborative efforts in achieving this goal (Geurts, 2019). This responsibility is referred to as communicative responsibility. In other words, a company has responsibility for crisis (i.e., crisis responsibility) and responsibility for communicating with consumers (i.e., communicative responsibility). Crisis responsibility is evident at the time of the crisis and related to the attribution of the crisis. Communicative responsibility is relevant when crafting the crisis response message and interacting with its receivers.

In the context of crisis communication, CRT predicts that consumers judge the appropriateness of the company's apologies based on the relative level of communicative responsibility. In other words, for consumers who perceive the company to bear a high level of communicative responsibility in helping the consumers under the crisis situation, they expect the company to use a message that adheres to their expectations. When the apology successfully helps these consumers to understand the crisis, the apology is perceived to be appropriate. In general, the consumers expect the company to have a higher communicative responsibility. According to Dibble (2012), the asymmetry in communicative responsibility is evident because the message creator (i.e., the company) has more communicative responsibility than the receiver (i.e., the consumers) when delivering bad news (i.e., the crisis). Furthermore, a crisis creates a state of uncertainty which consumers want to resolve (Coombs, 2000). As a result, they seek explanations for the cause of the crisis (Coombs et al., 2010). The crisis response messages that include explanations of the crisis are perceived to be appropriate (Dulaney and Gunn, 2018). According to Coombs (2007b), refusing to share information about the crisis with the consumer is unethical: companies have the obligation to protect the consumers who are vulnerable to the crisis.

As the evaluation of communicative responsibility is based on subjective perception, there will be individual variations. For those who consider the company to have much more communicative responsibility than the consumers, they expect the company to devote much more effort to help them understand the situation. This devotion may be better reflected in an accommodative apology than the deny apology. When the company is blaming someone else for the crisis, the consumers are likely to perceive the whole message as insincere and unacceptable. As the authenticity of the message is questioned in a deny apology, consumers may consider the company to be deceptive and manipulative (Compton, 2016). Consequently, consumers doubt the company's attribution of the crisis and the credibility of the company's scapegoat, which prevents them from having an accurate sense of the crisis (Bonazzi, 1983). Thus, the difference in the appropriateness of the two apologies will be greater for consumers who perceive a larger asymmetry in the communicative responsibility (i.e., the company having a higher communicative responsibility than the consumers). In other words, the consumer's perceived symmetry in communicative responsibility will moderate the relationship between apology type and appropriateness. Two hypotheses are advanced to examine these predictions (see Figure 1 for the conceptualized mediated moderation model):

> *H3*: The South Korean consumers will perceive the communicative responsibility to be asymmetrical: the company has a higher responsibility than them.
>
> *H4*: The difference between the perceived appropriateness of the accommodative and the deny apology will be greater for South Korean consumers who perceive the company to have a higher communicative responsibility than them.

Materials and methods

Participants and procedure

A total of 392 Koreans were recruited from a South Korean online survey company's nation-wide panel[1]. Around half of them were women (49.48%), and their average age was 44.58 (SD = 13.18). Most of the participants received university-level or higher education (n = 334, 85%) and were working full-time (n = 244, 62%). The median interval for the participant's monthly income was between two and three million won, which is consistent with the national median (Korean Statistical Information Service, 2021).

The participants first read that the seat belts of the car they recently purchased were malfunctioning for some time. They then read a news article that reported a traffic accident which caused severe casualties due to the malfunctioning of the seat belts. The same company the participants purchased their cars from also produced the cars mentioned in the news reports. We used a hypothetical company in this study to control for participant's existing attitudes and prior experience. We chose an automobile company because numerous companies in this industry (e.g., BMW, Mercedes-Benz, Toyota, and Volkswagen) responded to crises using apologies (Ihlen, 2002; Hearit and Courtright, 2003; Choi and Chung, 2013; Trefis Team, 2016; Nam, 2018). Seat belt malfunction was chosen as automobile crises in South Korea are often related to defects in their products (including those related to the safety of the passengers; Min and Choi, 2015; Transportation Traffic Safety

1 https://www.embrain.com/eng/

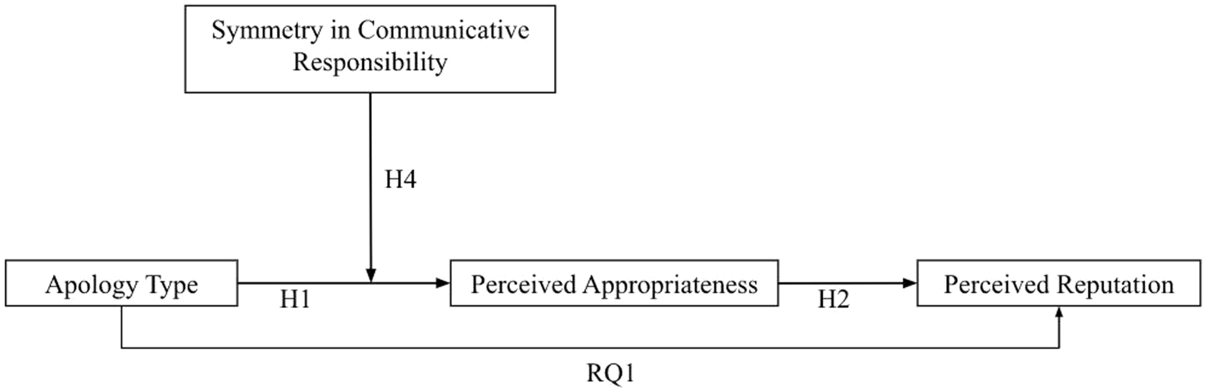

FIGURE 1
The hypothesized mediated moderation effect.

Team, 2016). The news article and vignettes are validated by Im et al. (2021).

To examine the appropriateness of different apologies, we randomly allocated participants to one of two groups. These groups read different vignettes that contained the crisis response messages of the company. In both conditions, the vignette included the company's apology (i.e., "We apologize for the incident regarding the seat belt malfunction") and a detailed account of the crisis (i.e., when and where the traffic accident happened). In the accommodative apology condition, the company stated that they will provide compensation for the victims. For the deny apology condition, the company scapegoated the crisis to the subcontractor who provides the necessary components of the seat belt. The participants then evaluated the appropriateness of the apology, the communicative responsibilities and the company's reputation.

Measures

We measured the communicative responsibility of the company and the participants, each with three items on a 5-point Likert scale (Aune et al., 2005). For instance, "given the context of this incident, it is mostly the company's responsibility to make sure that the consumers understand the situation" and "it is appropriate, in this context, that the company works harder than the consumers to make certain that they understand this incident" are examples of items that measured the participant's perception of the company's communicative responsibility. To measure the participant's perception of their own communicative responsibility, 'consumers' was replaced with 'company' and vice versa. The items were reliable (Cronbach's $\alpha = 0.81$ for both communicative responsibilities). We computed the mean scores for both communicative responsibilities.

The symmetry in communicative responsibility was computed by subtracting the mean score of the participant's communicative responsibility from the mean score of the company's communicative responsibility. A positive score indicates an asymmetry where the participants consider the company to have a higher degree of communicative responsibility than themselves. 0 indicates a perfect symmetry where the participant perceives the company to have the equal amount of burden in creating a mutual understanding about the crisis. A negative score indicates that the participants consider the company to have lower communicative responsibility than themselves.

The appropriateness of an apology was measured with 12 items on a 5-point Likert scale related to the perceived sincerity, acceptability, and effectiveness of the apology (Kim, 2006). A principal component analysis indicated that the 12 items were loaded on a single factor, explaining 79% of the variance. The 12 items were reliable (Cronbach's $\alpha = 0.98$). We computed the means score across the 12 items.

We measured the company's reputation by modifying the five items on a 5-point Likert scale used in the study by Coombs and Holladay (2002) to fit the context of this study. For example, "the company is concerned with the well-being of the public" and "the organization is basically dishonest." The Cronbach's α was 0.87, indicating that the five items were reliable. We computed the mean score across these items.

Results

Manipulation check

This study conceptualized the two apologies to be different in the amount of crisis responsibility the company acknowledges. We used three items on a 5-point Likert scale to measure if the participants perceived the accommodative apology to exhibit a higher level of crisis responsibility acceptance than the deny apology (Coombs and Holladay, 2008). These items were reliable (Cronbach's $\alpha = 0.94$). The results of independent sample *t*-test indicates that the participants perceived the company to have accepted more responsibility of the crisis after reading the accommodative apology ($M = 3.87$, $SD = 0.73$) compared to the deny apology ($M = 2.22$, $SD = 0.92$), $t\ (390) = 19.62$, $p < 0.001$.

Testing the symmetry in communicative responsibility

To examine if the participants perceived the company to have a higher communicative responsibility than the consumers in general (H3), we conducted a one-sample *t*-test that compared the symmetry in communicative responsibility with the test value of 0. The results indicated that there was an asymmetry in the communicative

TABLE 1 Summary of process model.

	Dependent variable					
	Appropriateness			Reputation		
	B	*SE*	*t*	*B*	*SE*	*t*
Apology type[1]	−1.16	0.07	−16.29***	0.03	0.06	0.44
Appropriateness of apology	-	-	-	0.7	0.03	21.59***
Symmetry in communicative responsibility	−0.02	0.04	−0.48	−0.03	0.03	−1.09
Apology type × Symmetry in communicative responsibility	−0.19	0.06	−3.05**	<0.01	0.04	0.11
Constant	3.24	0.05	63.80***	0.94	0.11	8.57***
	$R^2 = 0.42$ (3, 388) = 95.29***			$R^2 = 0.67$ (4, 387) = 200.30***		

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. [1]Dummy coded with the accommodative apology as the referent group.

TABLE 2 The moderating effects of symmetry in communicative responsibility.

	Apology type → Appropriateness			
	B	*SE*	*t*	95% bootstrap CI[1]
Symmetry in communicative responsibility				
−1.49 (16th percentile)	−0.88	0.2	−7.67***	−1.11 to −0.66
0.17 (50th percentile)	−1.19	0.07	−16.56***	−1.34 to −1.05
1.17 (84th percentile)	−1.38	0.1	−13.70***	−1.58 to −1.18
	Apology type → Reputation			
	B	*SE*	*t*	95% CI
Symmetry in communicative responsibility				
−1.49 (16th percentile)	0.02	0.08	0.25	−0.14 to 0.17
0.17 (50th percentile)	0.03	0.06	0.44	−0.09 to 0.14
1.17 (84th percentile)	0.03	0.03	0.4	−0.12 to 0.18

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. [1]5000 bootstrapping iterations to calculate 95% confidence interval.

responsibility ($M = 1.49$, $SD = 1.18$), $t(391) = 25.13$, $p < 0.001$. Most of the participants ($n = 325$, 82.91%) perceived the communicative responsibility of the company to be higher than that of consumers. While 36 of them (9.18%) considered a perfect symmetry in communicative responsibility, there were some participants ($n = 31$, 7.91%) who perceived the consumers to have a higher burden of understanding what happened in the traffic accident compared to the company. Thus, the data was consistent with H3, but also indicates that there are individual differences in the assessment of communicative responsibility.

Process analysis

To test and answer *H*1, *H*2, *H*4, and RQ1, a process analysis was conducted. According to Hayes (2018), the process analysis examines mediation and moderation effects in a single coherent model. In this study, model 8 was used to analyze the predicted relationships between the variables as illustrated in Figure 1. This model shows the effect of apology type on the reputation of the company to be mediated by the perceived appropriateness of the apology. In addition, the relationship between apology type and its appropriateness is moderated by the symmetry in communicative responsibility. To prepare for the process analysis, the apology type was dummy coded: the accommodative apology is 0, and the deny apology is 1. The moderator, symmetry in communicative responsibility, was mean-centered. To examine the interaction effect of apology type and the moderator, we selected a pick-a-point approach (16th, 50th, and 84th percentile of the moderator; Hayes, 2018).

The appropriateness of the apology was significantly related to the apology type and symmetry in communicative responsibility, F (3, 388) = 95.29, $p < 0.001$, $R^2 = 0.42$ (see Table 1). The participants perceived the accommodative apology to be more appropriate than the deny apology ($B = -1.16$). The significant interaction effect between apology type and symmetry in communicative responsibility indicates that the difference between the two apologies varies across individuals ($B = -0.19$). The pick-a-point approach shows that the participants who perceived the company to have a relatively high communicative responsibility (i.e., the 84th percentile of the symmetry in communicative responsibility) finds deny apology to be much more inappropriate compared to those who put less communicative burden on the company (see Table 2; Figure 2). Therefore, the data was consistent with *H*1 and *H*4.

Regarding H2, the process model examining the effects of apology type, appropriateness of the apology, and symmetry in communicative responsibility on the reputation of the company was significant, F (4, 387) = 200.30, $p < 0.001$, $R^2 = 0.67$. The results indicated that the appropriateness of the apology was positively related to the overall reputation ($B = 0.70$). However, the types of apology, communicative responsibilities, and their interaction were not significantly related to the reputation. Thus, the data was consistent with H2.

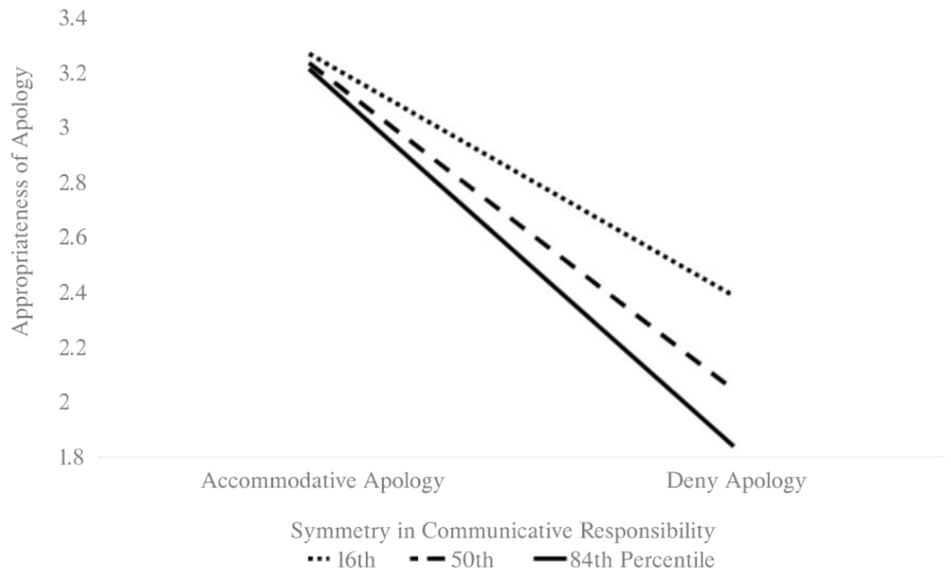

FIGURE 2
Simple slope analysis of signification moderation effect. The line graph shows the change in the effect of the apology type on its appropriateness on the three levels of symmetry in the communicative responsibility. The higher the percentile, the participants attributed more communicative responsibility to the company instead of the consumers.

The direct effect analysis of the process model answers RQ1. As shown in Table 2, the direct effect was statistically insignificant on all three levels of the moderator (i.e., 16th, 50th, and 84th percentile of symmetry in communicative responsibility). This indicates that the appropriateness of the apology fully mediated the relationship between apology type and perceived reputation. Consequently, the relationship between apology type and reputation is a mediated moderation (see Muller et al., 2005).

Discussion

This study examined the mediated moderation effect of apology type on the reputation of the automobile company in the context of crisis communication. The results of the process analysis indicated that an apology that includes compensation was more appropriate than those used with scapegoating. The perceived appropriateness was positively related to the perceived reputation of the company. There were individual differences in the perceived appropriateness of the apologies, which were explained by CRT. Compared to the appropriateness of the accommodative apology, the appropriateness of the deny apology varied depending on the individual's perceived symmetry of communicative responsibility. For participants who attributed more communicative responsibility to the company, the deny apology was considered as less appropriate.

This study contributes to what Coombs and Holladay (2002) have recommended: we need more research on the mechanism behind the crisis response strategies, especially from the perspective of the message receivers. The mediated moderation effect examined in this research investigated the mechanism behind the relationship between apologies and the company's reputation (i.e., the mediation) and the condition in which the relationship varies (i.e., moderator; Baron and Kenny, 1986). Consistent with the literature, the findings indicated that the composition of an apology is related to its appropriateness and, subsequently, the reputation of the company. According to Pace et al. (2010), the consumers may not consider the company to be acknowledging its crisis responsibility when it simply says, "we apologize for this situation." For this reason, an apology needs to be complemented by other crisis response strategies, such as compensation, to validate its authenticity (Bentley, 2018). The consumers may consider the accommodative apologies to demonstrate the company's willingness to take responsibility for the crisis and actively remedy the consequences of the crisis. When the company takes responsible actions instead of blaming others, the consumers are likely to see it positively because the apology conveys its willingness to learn from the mistake to prevent future recurrences (Schultz et al., 2011; Yuan et al., 2016). On the other hand, the deny apology is less appropriate and leads to less positive reputational evaluation from the consumers because it can make the consumers doubt the sincerity of the provided crisis response message. When the consumers believe that the company is not providing accurate and sufficient information about the crisis, consumers perceive the company to be less transparent (Coombs, 2007b). In other words, the consumer's negative evaluation of the apology spills over to the company's reputation.

Consumers do not always perceive or interpret the crisis response messages as intended by the company (Choi and Chung, 2013). This may be due to the different expectations that arise from idiosyncratic evaluations of communicative responsibility. For the participants who put more burden on the company to explain the crisis, the appropriateness of the deny apology decreases even more. As they expect more from the company to provide accurate and proper information, the negative violation of the deny apology is greater for them (Burgoon, 2015). Therefore, examining crisis communication from the perspective of collaborative meaning-making (as CRT suggests) helps us better understand the individual differences within the message receivers.

Although we examined two types of apologies that are likely to be used by South Korean companies in practice, the results should not be interpreted as 'always use an accommodative apology because it is better at managing the reputation of the company.' The company needs to weigh the difference in the appropriateness and potential repercussions of the apologies. Considering the different factors that affects assessment of communicative responsibility (Aune et al., 2005), a deny apology may be relatively more appropriate when the crisis is straightforward and simple for the consumers to understand, when uncertainty is considered a virtue in the consumers' culture, and when the company is clearly the victim (i.e., the consumers agree that the company also does not know when or how the crisis happened). In cases where the company clearly has disproportionately high communicative responsibility, an accommodative apology may be more beneficial despite the financial liabilities (Hearit, 2006; Coombs, 2007a). When the company fails to appease the disappointed consumers, it may need to apologize again (Compton, 2016), and face a reduction in market share and consumer loyalty (Blodgett et al., 1995). Thus, in the long run, a well-received apology can successfully minimize the company's financial costs (Tax et al., 1998).

We should consider the South Korean context when interpreting the findings. This study focused specifically on apologies, as the majority of South Korean companies (78.65%) used them regardless of the crisis situation (Park and Ha, 2014). According to Claeys and Schwarz (2016), apologies may be perceived as less sincere in cultures where apologies are more frequently used. Although South Korean consumers expect apologies, they may be easily skeptical of the sincerity when there is evidence to do so (e.g., scapegoating). Additionally, the collectivistic culture in South Korea encourages collective responsibility. South Koreans are likely to be angry and perceive the company negatively when it attributed the crisis to a single employee instead of taking responsibility as an organizational entity (An et al., 2010). The expectation of collective responsibility may also apply to crises that are caused by the subcontractors. Consequently, the normative and cultural context may explain South Koreans' sensitivity to deny apologies. The generalization of this study's findings may be limited to other cultures that emphasize collective responsibility (e.g., Japan; Barkley, 2020). As companies in the United States tend to give excuses more frequently than South Korean companies (Kim and Lee, 2021), the inappropriateness of deny apologies may be less severe.

Limitations and future directions

Although the South Korean context is noteworthy as its companies are being globally recognized and economically impactful, this study is limited to a single cultural context. A cross-cultural study is needed to (a) better understand to what extent the findings of a single culture can be generalized, and (b) examine what specific cultural differences or similarities explain the results. We encourage future researchers to investigate the relationships between cultural variables (e.g., collectivism/individualism and high/low context), crisis attribution, communicative responsibility, and crisis message appraisal.

The scope of this research is limited to a single crisis situation (i.e., product malfunction). Therefore, the given situation may be categorized as either an accidental or a preventable crisis depending on how the crisis is described. For instance, if an unexpected equipment failure caused the product malfunction, the given situation can be categorized into the accidental cluster. However, if the product malfunction was intended by a member of the company, it is a preventable crisis. According to Coombs and Holladay (2002), crisis type should be evaluated before devising a crisis response strategy. This is because each crisis cluster attributes a similar amount of crisis responsibility to the company, which enables it to use a similar response for various crises within a cluster. Additionally, the consumer may find an apology to be insincere if the company is highly accountable for the crisis (Lwin et al., 2017). In this case, the difference between the appropriateness of the two apologies may be smaller than what was examined in this study. Additionally, considering the cultural differences in crisis attribution, intersecting variations in culture and in crisis situation can push the envelope of crisis communication research.

In respect to CRT, the asymmetry in the communicative responsibility may change depending on the company's responsibility for the crisis. For instance, Dulek and Campbell (2015) found that CEOs may strategically use indirect language and avoid explicit explanations when communicating about the unexpected collapse of the financial market with the stakeholders. Because the incident was unanticipated, the CEOs have low crisis responsibility. Additionally, the communicative responsibilities of the CEO and the stakeholders are symmetrical, as neither of them are fully aware of what happened and what will happen next. Therefore, being strategically vague in communication is justified. Thus, it is recommended for future research to evaluate how communicative responsibility changes as the company's crisis responsibility changes.

Future researchers can also examine the effect of a company's performance history on the appropriateness of the crisis response. It is possible for the consumers to perceive an accommodative apology as insincere if the company has a long history of repeated misdeeds. The seemingly appropriate apology (i.e., accommodative apology) may backfire when the consumers do not trust the company. By utilizing an existing organization, instead of a hypothetical one, the impact of the company's crisis history can be examined. Therefore, future research may benefit from conducting case studies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Does Confucian culture affect public service motivation of grassroots public servants? Evidence from China

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Public service motivation contains distinctive cultural characteristics. Different cultural backgrounds shape public service motives with different connotations and levels. However, the traditional cultural values rooted in historical development and socialization process have not received enough attention in the research on public service motivation. In order to investigate the influence of Confucian culture based on Chinese scenes on public service motivation, in the current study we collected 1308 representative questionnaires from 12 cities in central and eastern China, and adopted the dual fixed effect model and moderating effect model to verify six hypotheses. The empirical results showed that Confucian culture has different effects on public service motivation from four dimensions, namely, attraction to politics and policy making (APP), commitment to public interest (CPI), compassion (COM), and self-sacrifice (SS). The paternalistic leadership plays a part in moderating the influence of Confucian culture on public service motivation. This study not only expands the cross-cultural applicability of the theory of public service motivation in non-western countries, but also supplements the evidence of research on public service motivation in East Asian countries. In practice, it is necessary for the organizations to consider the importance of specific cultural values for organizational culture and personal value orientation.

KEYWORDS

Confucian culture, public service motivation, paternalistic leadership, public servants, traditionality

1. Introduction

How to motivate public servants has been a topic of close concern of the public sectors and endless debate among scholars. The emergence of the theory of Public Service Motivation (PSM) provides a new solution to this question. Although public service motivation has profound connotation, the academic community has reached a basic consensus on this concept, that is, the motivation and action aiming at benefiting others and shaping social welfare (Perry and Hondeghem, 2008). Such "altruistic" motivation can stimulate individuals to take action for the interests of a wider range of political organizations at the right time (Vandenabeele, 2007). In understanding the antecedent variables of public service motivation, scholars have noticed that cultural values have an impact on work motivation (Lyons et al., 2006). In fact, the public service motivation reflects a value norm. However, the traditional cultural values rooted in historical development and socialization process have not received enough attention in the research on public service motivation.

In Chinese society, Confucian culture is the most influential traditional culture, and also a key factor in shaping the political attitude of Chinese people (Zhai, 2018). The influence of Confucian culture on Chinese bureaucratic behavior is far-reaching and lasting, and it has spread to East Asian countries and regions. Under the influence of Confucianism, compared with Westerners who place more emphasis on liberalism and individualism, East Asians tend to be more obedient and pay more attention to collectivism (Van der Wal and Yang, 2015), which can improve the organizational performance of Chinese public sectors (Park and Word, 2012). To sum up, Confucian culture may have an impact on the public service motivation of public servants.

Although the literature has touched on the practice and application of Confucian culture in the field of politics and public management, few studies have deeply explored the mechanism between Confucian culture and public service motivation. To what extent is the public service motivation in the Chinese context influenced by Confucian culture? Currently, there is still a lack of serious research and discussion on this question. In view of this, this study attempts to build a theoretical model between traditional Chinese Confucian culture and public service motivation.

Different from previous studies, this study takes Confucian culture as the antecedent variable, and proposes a new theoretical perspective on public service motivation. Based on the empirical data of grassroots public servants in 12 cities in China, and in the real scene of the value field, this study tests the applicability of public service motivation in the Chinese social and cultural background in a bid to expand the explanatory power of the theory of public service motivation in cross-cultural management situations. Additionally, this study adds paternalistic leadership shaped by Confucian culture as a moderating variable to further understand the effect of Confucian culture in different roles and scenes on public service motivation. Furthermore, from the perspective of organizational management, this study suggests that the relationship between culture values and public service motivation should be considered in respect of incentives for public servants in the public personnel management. This study is contributive to the Chinese public sectors to adopt appropriate organizational culture and Confucian leadership to encourage grassroots public servants to continuously engage in the public endeavor of "serving the people wholeheartedly."

2. Literature review and research hypotheses

2.1. Understand the principle of public service motivation

2.1.1. Self-determination theory

Self-Determination Theory (SDT) is a motivation theory about human behavior and personality development, which emphasizes the role of matching individual needs with environment (Deci and Ryan, 2008). According to the continuum of motivation, it can be divided into intrinsic motivation, extrinsic motivation and amotivation, in which, extrinsic motivation can be divided into external regulation, introjected regulation, identified regulation, and integrated regulation (Ryan and Deci, 2009, 2017, 2020). SDT is a psychological analysis framework for studying PSM (Ryan and Deci, 2017). Under this framework, some scholars measure the internal motivation of PSM with the "service motivation" of value internalization (Vandenabeele, 2007; Park and Word, 2012; Chen and Bozeman, 2013), and believe that cultural values are the internal factors to stimulate public service motivation (Andrews, 2016). It explains the relationship between cultural values and public service motivation as a whole (Vandenabeele, 2007, 2014; Kim, 2009). From the perspective of self-determinism, some scholars also propose that the inward adjustment of Oriental traditional culture constitutes the identification adjustment of extrinsic motivation for the work values of Chinese civil servants (Han and Sun, 2022). Other scholars argue that public service motivation lies between intrinsic motivation and extrinsic motivation (Jacobsen et al., 2014), or it is regard as the integration of intrinsic motivation and extrinsic motivation. For example, (Breaugh et al., 2018), believe that the rational self-interest dimension of public service motivation is more consistent with external motivation, and altruistic motivation is more consistent with internal motivation. This integrated motivation includes a broad understanding of values and beliefs. In general, SDT provides an effective way to explain why cultural values become the antecedent of public service motivation.

2.1.2. Person–Organization fit

Person–Organization fit is root in the interactionist theory of behavior (Muchinsky and Monahan, 1987) and define as "The compatibility between people and organizations" (Kristof, 1996). It means that when at least one entity meets the needs of another entity or two entities have similar basic characteristics or both, compatibility and supplementary fit between people and organizations will be realized (Kristof, 1996). Some studies believe that work values are the core factor in judging P-O fit (Kristof, 1996; Sekiguchi, 2007). The higher the level of PSM of individuals, the more likely they are to seek to join the public sector (Perry and Wise, 1990; Kim, 2018). This view is consistent with P-O fit. P-O fit thus is often used to explain the antecedents and consequences of PSM (Vandenabeele, 2007; Steijn, 2008). Bright (2007) argues that the reason why individuals with high PSM level are attracted to public organizations is that these organizations include working conditions and tasks that support their public service motivation. Individuals strongly agree with the cultural values and mission of the organization, and organizations will also choose employees who match their cultural values (Bright, 2007; Kim, 2012; Jin et al., 2018). To sum up, individuals will choose to enter the public sector due to the consistency of their values. In the process of organizational cultivation and socialization, cultural values may also become an explanatory variable of employees' public service motivation (Moynihan and Pandey, 2007; Andrews, 2016).

2.2. Applicability of cross-cultural research on public service motivation

2.2.1. The relationship between Confucian culture and public service motivation

The research on public service motivation originated from American society. Perry and Wise (1990) analyzed public service motivation from rational, normative and affective dimensions, and incorporated the social context variable into this framework. The process theory of public service motivation holds that public service motivation is cultivated through the process of socialization (Moynihan and Pandey, 2007), which reflects a series of values, norms, and beliefs (Perry and Hondeghem, 2008). It has been confirmed that the public service systems of various countries imply unique cultural values, and there are different modes and levels of public service motivation in different cultural fields (Anderfuhren-Biget, 2012; Gupta et al., 2020), for instance, China (Lee et al., 2020) and Republic of Korea (Kim, 2009; Lee et al., 2020) in East Asia under the guidance of Confucian culture, India with ancient civilization (Gupta et al., 2020), Iraq (Hassan and Ahmad, 2021), and Pakistan (Quratulain et al., 2019) under the dominance of Islamic culture, all of which have different public service motivations with different structures and dimensions. No matter from the perspectives of concept, structure or measurement, public service motivation has distinctive cultural characteristics.

Due to the cultural differences in public service motivation, scholars began to pay attention to Confucian culture which is the ancient and powerful cultural foundation in East Asia, and explored how Confucian values affect individual public service motivation. For example, Kim (2009) believed that due to the high homogeneity of Korean society, Koreans have a common sense of national identity and cultural identity (Macdonald and Clark, 2018). Under the influence of Confucian virtues and collectivist cultural atmosphere, Koreans tend to become civil servants and serve the public interest. Kang et al. (2017) believed that "loyalty," "righteousness," "benevolence," and "relationship orientation" in Confucian values have a positive impact on normative and affective motivations. Lee et al. (2020) confirmed through the data of public sectors in China and ROK that the Confucian culture based on collectivism can affect public service motivation. Apparently, existing studies have confirmed that Confucian values are one of the antecedents influencing the public service motivation of public servants (Lee et al., 2020; Kim and Torneo, 2021).

2.2.2. The Confucian culture and public service motivation in the Chinese context

It is necessary to analyze the relationship between sociocultural characteristics and public service motivation to explain the public service motivation of Chinese public servants. The public service motivation was originally put forward by western scholars to break through the shackles of the "economic man" hypothesis for explaining the action power of public servants. Perry found that the salary of the American public sectors was significantly lower than that of the private sectors, but the public sectors still attracted a large number of individuals for employment, and it was the public service motivation that made up the salary incentive gap. Although there is no huge gap between the public and non-public sectors in China in guaranteeing the individuals' basic needs, the characteristic behaviors of voluntary contributions of Chinese public servants, such as "working voluntarily on Saturday," "five plus two (five weekdays + weekend)," and "white plus black (daytime +nighttime)," can not be analyzed simply by "rational economic man" (Han and Sun, 2019). Besides, scholars claimed that in addition to extrinsic incentives such as material factors, these active altruistic behaviors also derive from the influence of altruistic value norms such as "virtue" and "benevolence" in traditional Confucian culture for a long time (Yang and Yang, 2021), and become the value foundation of "serving the people wholeheartedly" among Chinese public servants. Studies have shown that the working atmosphere created by the Confucian culture can promote the loyalty and perseverance of the members of the organization, which is an explanation for the overtime and self-dedication of public servants (Kim and Torneo, 2021).

Liu (2009) proposed that the public service motivation based on norms and affections in the attitude, morality and behavior of Chinese public servants can be attributed to Confucian values. Li (2014), based on the theoretical analysis of cultural orientation, mapped the "benevolence," "righteousness," "neutralization," and "the greater self" in Chinese Confucian culture to Perry's four dimensions to construct a cultural expansion scale, and verified the relationship between Confucian culture and public service motivation. Mei et al. (2021) argued that Chinese people are deeply influenced by traditional culture. For example, the values of "benevolence," "courtesy," and "righteousness" in Confucian culture can improve the level of public service motivation of public servants, while negative concepts such as "bureaucratic standard" hinder the development of public service motivation. It can be seen that the academia has gradually noticed that the Confucian culture is a force that affects the public service motivation, and has carried out theoretical deconstruction and practical verification in succession. However, there is still a lack of further empirical analysis between the Confucian culture and the public service motivation in the current Chinese context, and there is insufficient observation on the expanded vision of the Confucian culture. Having recognized the limitations of previous studies, this study takes the "individual traditionality" characteristics of the Chinese rooted in Confucian culture as the antecedent variable of public service motivation, and uses the survey data of 13 Chinese cities to interpret the applicability of public service motivation based on specific cultural background. Given that, hypothesis 1 is proposed:

> *H1: Confucian culture has a significant effect on public service motivation.*

2.3. How Confucian culture affects public service motivation

Confucian classics such as *The Analects of Confucius*, *The Book of Rites*, and *Mencius* reveal that such ideas as "the whole world as one community," "people-oriented," "a gentleman maintains his own integrity in obscurity and endeavors to benefit the world in times of success" had a wide impact on ancient Chinese bureaucrats, and these philosophies and public service motivations had different approaches but equally satisfactory results. The value system of Confucian culture is diverse and complex, in which a variety of political, ethical and moral norms are integrated. Unlike most western theories, Confucianism has no unified theory of knowledge (Zhao, 2021). From primitive Confucianism to modern neo-Confucianism, different times, different historical backgrounds, and different interpreters endow it with different meanings through inheritance and creation (Zhang and Dong, 2021; Lu, 2022; Zhu, 2022). This study focuses more on the effect mechanism of "submission to authority" and "fatalism and defensiveness" in public service motivation. First of all, these two kinds of Chinese unique psychology are produced under the influence of traditional Chinese Confucian culture (Yang, 2004), and they widely exist in Confucian classics. For example, the Confucian system emphasizes the "Three Cardinal Guides (ruler guides subject, father guides son, and husband guides wife) and Five Constant Virtues (benevolence, righteousness, propriety, knowledge, and sincerity)," that is, the dominance of authority. In addition, the Confucian culture advocates "submission to the destiny," and the traditional Confucianism maintains interpersonal relationships through the interpretation of "fatalism" to build a harmonious, stable, and sustainable family and society (Yang, 2004). Second, in interdisciplinary research, they are considered as part of the "traditional" Chinese psychology (Yang, 2004; Kao and Lu, 2006), and represents different connotations of Confucian values. Finally, in the relationship between Confucian culture and public service motivation, few scholars pay attention to these two dimensions. Therefore, this study selects "submission to authority" and "fatalism and defensiveness" as the dimensions to measure Confucian culture.

2.3.1. The influence of submission to authority on public service motivation

Submission to authority emphasizes that in a social situation full of various roles, identities and interpersonal relationships, authority should be observed, complied with and trusted. Submission to authority actually stems from a well-known Confucian value: filial piety. At first, under the rule of filial piety, in order to show respect for parents' seniority, children must obey their parents' wishes and suppress their own desires to maintain a harmonious family relationship. From ancient times to the present, filial piety has been regarded as a traditional virtue by Chinese people and is highly respected. In the process of socialization, obedience to parents can easily be generalized to local officials (parents-like magistrates) through the process of pan-familism, and then extended to the emperor who has the highest ruling power so that officials and monarchs have absolute authority like fathers in people's hearts, which also constitutes the "authoritarianism orientation" of Chinese people (Yang, 2004).

In ancient China, the traditional culture based on Confucian ethics highly respected the authority of the monarch. The worship and pursuit of status and power not only formed the "authoritarianism orientation," but also promoted the "bureaucratic standard," which became one of the social psychology derived from the bureaucratic political system. The worship of authority, the yearning for power, and the pride of being officials permeated all corners of ancient Chinese society, and are still influencing the present. Empirical evidence shows that China's hierarchical culture is positively correlated with policy making-oriented PSM (Lee et al., 2020). P-O fit indicates that, compared with those who strongly desire autonomy, those who submit to authority would feel better personal organizational fit, trust the organization more and respect the leadership authority, and show more positive working attitude and motivation (De Cooman et al., 2009), thus promoting PSM. Since authoritarian leaders usually require their subordinates to fully follow their rules, they will hold them accountable if they do not obey orders (Chan et al., 2013). Therefore, from the perspective of self-protection and higher performance (Wang and Guan, 2018), submission to authority may promote the APP dimension of PSM. Submission to authority represents high power distance (Begley et al., 2002). In Confucian culture, state leaders and public sector managers have the obligation to ensure peace, prosperity and justice to make people well-being (Frederickson, 2002), while individual subjective values are usually guided by collective common culture and personal experience (Schwartz, 1992). Therefore, in the face of organizational difficulties and work contradictions, employees who uphold the values of submission to authority will give priority to the "the whole belongs to all" and "serving the people" advocated by the organizational values, and emphasize the commitment to public interests. At the same time, Confucian collectivist culture attaches great importance to harmony, reciprocity (Frederickson, 2002) and helping others (Varela et al., 2010), requires individual interests to be subordinate to collective interests, and will protect collective welfare at the cost of individual interests (Moorman and Blakely, 1995). Therefore, the more subordinate to the collective authority, the more likely it is to strengthen the COM and SS dimensions in PSM. Based on this, hypothesis 2 is proposed:

> *H2: Submission to authority in Confucian culture has a significant influence on public service motivation.*
>
> *H2.1: Submission to authority is positively correlated with public service motivation from the dimension of attraction to politics and policy making (APP).*
>
> *H2.2: Submission to authority is positively correlated with public service motivation from the dimension of commitment to the public interest (CPI).*
>
> *H2.3: Submission to authority is positively correlated with public service motivation from the dimension of compassion (COM).*
>
> *H2.4: Submission to authority is positively correlated with public service motivation from the dimension of self-sacrifice (SS).*

2.3.2. Influence of fatalism and defensiveness on public service motivation

Fatalism emphasizes the beliefs in fate, luck and opportunity, as well as the helplessness of external environmental factors (such as money and power), which is an external control belief (Rotter, 1966), while defensiveness emphasizes the self-serving behavior of "being wise for one's own life" and "minding one's own business" because of the sense of powerlessness generated by the external control tendency (Yang, 2004). Empirical studies have shown that the external control tendency will reduce individual's willingness to help others and show selfish and aggressive behaviors, such as making people more inclined to cheat in exams (Baumeister et al., 2009). Therefore, the fatalistic and defensive attitude will urge public servants to strive for greater rights/powers to seek asylum for personal and family interests, including preference to use relationships to seek work or bribery for convenience (Yang, 2004). To sum up, the fatalistic and defensive attitude may positively affect the public service motivation based on reason and selfish APP dimensions.

Individuals who hold the fatalistic and defensive attitude tend to have external attribution tendency in their behavioral characteristics, and are easy to attribute success or failure to the predetermined "fate." Therefore, individuals with a fatalistic and defensive attitude tend to avoid the world passively or protect themselves when they are confronted with difficulties and obstacles. Yang (2004) confirmed through research that the fatalistic and defensive attitude of Chinese people is negatively correlated with job performance and organizational input. The self-protection attitude of "more is better than less" and "nothing matters" will reduce the individual's dedication to solving problems. In general, while promoting public servants to participate in public decision-making and strive for their own interests, they will also reduce the effort for concerning about public interests, thus negatively affecting the CPI, COM and SS dimensions of public service motivation. Based on this, hypothesis 3 is proposed:

> *H3: Fatalism and defensiveness in Confucian culture has a significant influence on public service motivation.*
>
> *H3.1: Fatalism and defensiveness is positively correlated with public service motivation from the APP dimension.*
>
> *H3.2: Fatalism and defensiveness is negatively correlated with public service motivation from the CPI dimension.*
>
> *H3.3: Fatalism and defensiveness is negatively correlated with public service motivation from the COM dimension.*
>
> *H3.4: Fatalism and defensiveness is negatively correlated with public service motivation from the SS dimension.*

2.4. The moderating role of paternalistic leadership

The traditional Confucian culture not only shaped people's values, but also gave birth to paternalistic leadership integrating authoritarianism, benevolence and morality (Farh and Cheng, 2000). Paternalistic leadership is based on the Confucian "family and the world" culture. It is defined as a "leadership style of strict discipline and authority, fatherly benevolence and moral integrity," including three dimensions of authoritarianism, benevolence, and morality (Farh and Cheng, 2000), which is an important feature of the current Chinese organizations (Cheng et al., 2004). Members who comply with authoritarianism are ready to maintain this hierarchical relationship and make more efforts to safeguard the interests of leaders and the collective (Cheng et al., 2004; Shen et al., 2019). Patriarchal leadership shows the interactive relationship between Chinese leaders and subordinates, and subordinates react differently in line with different leadership styles (Cheng et al., 2004). It can be inferred that paternalistic leadership plays a moderating role in the influence of Confucian culture on public service motivation.

2.4.1. The moderating effect of authoritarianism

Authoritarianism embodies the cultural characteristics of high power distance in Chinese society, and emphasizes the "superiority and inferiority" relationship between officials at upper and lower levels. Authoritarian leaders play the role of the father in the family. In order to effectively control subordinates, they maintain their unchallenged authority in the relationship between superiors and subordinates as fathers control children. The exploration on the mechanism of authoritarianism has formed two types of views. On the one hand, scholars believe that authoritarianism has a positive impact on individual organizational citizenship behavior (OCB), and it will stimulate highly traditional individuals to have a high degree of relationship recognition, obedience, and gratitude to the leadership authority. Members who comply with authoritarianism are ready to maintain this hierarchical relationship and make more efforts to safeguard the interests of leaders and the collective (Cheng et al., 2004; Shen et al., 2019). While protecting themselves from the censure of authoritarian leaders, they also strive to gain personal interests from the organizational interests. From this perspective, authoritarianism may generate positive incentives for rational public service motivation from the APP dimension.

On the other hand, a number of scholars believe that the low recognition of authoritarianism will inhibit the internal motivation of organizational members. Since authoritarianism means a distinct hierarchical relationship and power distance, in the absence of other value norms to attract individual identity, organizational members may regard authoritarian behavior as a threat to their own identity and respond with negative work attitude and resistance (Shen et al., 2019). According to the Over-justification Effect (Deci et al., 1995), the authoritarianism behavior shows strict, controlled, and even threatening external pressure, which tends to create psychological distance between public servants and leaders and organizations, preventing them from actively coping with challenges and seeking breakthroughs (Tuan, 2018). Therefore, the more authoritarianism a leader shows, the lower the internal motivation of subordinates (Chen et al., 2014) who are only willing to focus on profitable behaviors such as salary and welfare, rather than performing tasks to improve public services.

In a word, authoritarianism may be effective in seeking consistency of organizational goals, but it has a restraining effect in truly encouraging public servants to "serve the people wholeheartedly," thus negatively affecting the public service motivation from the CPI, COM, and SS dimensions. Based on this, hypothesis 4 is proposed:

> *H4: Authoritarianism plays a significant role in moderating the relationship between Confucian culture and public service motivation.*
>
> *H4.1: Authoritarianism positively moderates the influence of Confucian culture on public service motivation from the APP dimension.*
>
> *H4.2: Authoritarianism negatively moderates the influence of Confucian culture on public service motivation from the CPI dimension.*
>
> *H4.3: Authoritarianism negatively moderates the influence of Confucian culture on public service motivation from the COM dimension.*
>
> *H4.4: Authoritarianism negatively moderates the influence of Confucian culture on public service motivation from the SS dimension.*

2.4.2. The moderating effect of morality

The Confucian culture places great emphasis on personal moral cultivation, which can be described as "self-cultivation, a well-managed family, and the ability to administer the state and to bring peace to the nation." Moral leaders are highly respected and admired by Chinese employees and regarded as ideal leaders because of their integrity and concern for collective interests rather than their own interests (Niu et al., 2009). Studies have confirmed that subordinates' perception of leaders' moral level has a significant positive correlation with subordinates' job satisfaction, organizational commitment, and feelings towards the organization (Davis and Rothstein, 2006). When organizational members feel that leaders are fair, honest, and exemplary, they tend to identify with and internalize leaders' values and the collective goals they pursue, actively participate in public decision-making based on discretion, and are willing to make more personal contributions to the collective interests (Farh and Cheng, 2000), therefore, morality behavior can promote the behavior of organizational members both within and outside their roles (Chen et al., 2014). Based on this, hypothesis 5 is proposed:

> *H5: Morality plays a positive role in moderating the relationship between Confucian culture and public service motivation.*
>
> *H5.1: Morality positively moderates the influence of Confucian culture on public service motivation from the APP dimension.*

H5.2: Morality positively moderates the influence of Confucian culture on public service motivation from the CPI dimension.

H5.3: Morality positively moderates the influence of Confucian culture on public service motivation from the COM dimension.

H5.3: Morality positively moderates the influence of Confucian culture on public service motivation from the SS dimension.

2.4.3. The moderating effect of benevolence

In the Confucian society, a kind of responsibility based on the culture of benevolence existed between the ideal superiors and subordinates, that is, the benevolence from superiors to subordinates, and the reciprocation from subordinates to superiors, demonstrating a harmonious and mutually beneficial relationship. Research has confirmed that when subordinates feel enough support from supervisors, they will improve their willingness and actions to continue working hard for the organization (Eisenberger et al., 2002). Benevolence is not only reflected in the individual concern for the work of subordinates, but also extends this concern to the overall care of their family members, trying to get along with subordinates like a family (Farh and Cheng, 2000). This also forms an affective interest bond between leaders and subordinates. In Chinese public sectors, public servants are deeply influenced by traditional Confucian cultural values such as "courtesy demands reciprocity" and "being grateful and considerate in return." In order to repay the care, favors and benevolence given by leaders, the members of the organization will make themselves meet their leaders' expectations and organizational goals through hard work and self-dedication (Farh and Cheng, 2000). Based on this, hypothesis 6 is proposed:

H6: Benevolence plays a positive role in moderating the relationship between Confucian culture and public service motivation.

H 6.1: Benevolence plays a positive role in moderating the influence of Confucian culture on public service motivation from the APP dimension.

H6.2: Benevolence plays a positive role in moderating the influence of the Confucian culture on public service motivation from the CPI dimension.

H 6.3: Benevolence plays a positive role in moderating the influence of the Confucian culture on public service motivation from the COM dimension.

H 6.4: Benevolence plays a positive role in moderating the influence of the Confucian culture on public service motivation from the SS dimension.

Based on the above analysis, the relationships between variables in this study are shown in **Figure 1**.

3. Research methodology, variables, and data sources

3.1. Research methodology

This study selected the Fixed Effect Model and the dependent variable "public service motivation" as the continuous variable. The data were collected from 12 Chinese cities. The differences in the administrative and socioeconomic environment of different cities may have an impact on the perception of individuals. Besides, individuals may encounter the problem of missing variables over time. In order to control such unmeasured heterogeneity, this study adopted the dual fixed effects model including city and time (Gormley and Matsa, 2014). The equation is as follows:

$$Y_{ict} = \alpha_0 + \sum \beta x_{ict} + \chi_i + \delta_i + \varepsilon_{ict}$$

Y_{ict} represents the dependent variable. α_0 refers to the constant term, i is the individual serial number, c represents the city's serial number, t represents the year. $\sum \beta x_{ict}$ represents the independent variable, β is the coefficient, χ_i is the city fixed effect, δ_i is the time fixed effect, and ε_{ict} refers to random error.

3.2. Measurement of variables

The dependent variable is public service motivation. Referring to Perry's Public Service Motivation Scale, this study set up a total of 15 items. The APP measurement included three items, which was reverse measurement. Four items were to measure the CPI, three items for the COM measurement, five items for the SS measurement, and the Cronbach's α is 0.838.

The core independent variable is Confucian culture. Traditional Chinese psychology rooted in Confucian culture includes submission to authority, filial piety and ancestor worship, conservatism and endurance, fatalism and defensiveness, and male dominance (Yang, 2004). This study focuses on two independent variables, namely, (a) submission to authority, with Cronbach's α being 0.712; (b) fatalism and defensiveness, with Cronbach's α being 0.8.

The moderating variable is paternalistic leadership. The Paternalistic Leadership Scale developed by Farh and Cheng (2000) is used for the survey, and the ternary structure corresponds to the two measurement items, respectively. The Cronbach's α is 0.76.

The above variables were all measured by the Likert 5-point scale, ranging from 1 (disagree strongly) to 5 (agree strongly). The mean value is the continuous variable.

There are two types of control variables:

1. Demographic variables. Research has confirmed that demographic factors such as gender, age, and education

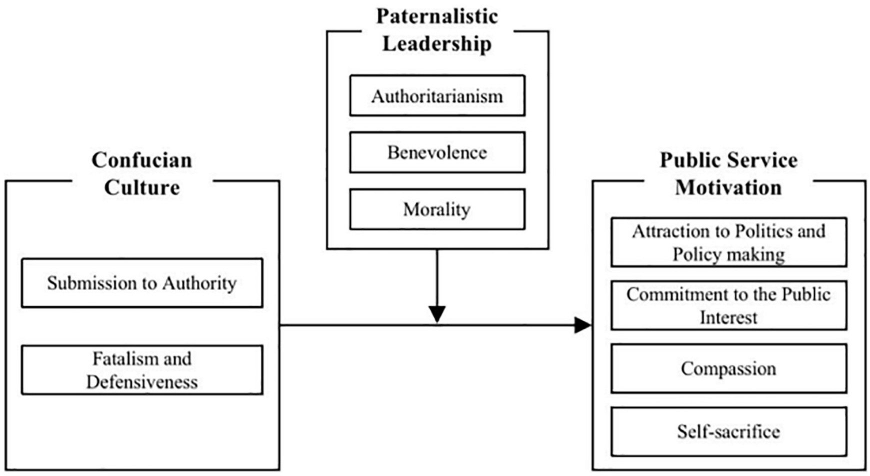

FIGURE 1
Schematic diagram of relationship among variables.

level will have a significant impact on individual's public service motivation (Perry, 1997; Vandenabeele, 2007). (a) Gender. (b) Age. Perry (1997) confirmed that age is positively correlated with public service motivation, which is a continuous variable. (c) Education level. Generally speaking, the public service motivation of highly educated groups is higher than that of low educated groups (Perry, 1997; Moynihan and Pandey, 2007). (d) Official rank. Xu and Li (2020) verified that the higher the individual's official rank, the stronger the public service motivation.

2. Sociological variables. Studies have confirmed that social and historical background factors are the antecedents of public service motivation (Vandenabeele, 2007, 2011; Perry and Hondeghem, 2008). (e) The political affiliation. In China's public service sectors, those with the Communist Party of China (CPC) membership tend to recognize the purpose of "serving the people wholeheartedly" (Duan, 2019), showing a higher level of public service motivation. (f) Social status. Those with higher social status have higher political responsiveness (Duan, 2019), and the level of public service motivation may be more significant. Social status refers to the objective measurement method proposed by Qian and Shen (2012), and uses the official rank measurement of public servants. The economic status is measured by the 10-point scale of the local economic level, where 1 means the lowest and 10 the highest.

3.3. Data sources

The data used in this study were collected by the research team. The survey was conducted from June 2018 to September 2022 among public servants in 14 district-level governments in 12 cities, including Shenzhen (Nanshan District, Banan District, and Longhua District), Hangzhou, Haikou, Suzhou, Taizhou, Nanchang, Quanzhou, Wuhan, Taiyuan, Datong, Tianjin, Wuxi, and Nanjing. The survey was arranged at the district and sub-district levels with the help of local "gatekeepers," and distributed according to the proportion of department personnel, mainly through written questionnaires and partly electronic questionnaires. It was estimated that 200 questionnaires would be distributed, and in reality150 were distributed to each city. Totally, 2,100 questionnaires were distributed, among which 1,308 questionnaires were valid, with a recovery rate of 62.29%. Constrained by objective conditions and impossible to obtain the sample data covering the whole country, the factors such as region, level, rank, and department had been considered in the sampling of this study. The survey data were of value for the exploratory study. The descriptive statistical results of effective samples are shown in Table 1. The samples covered the groups concerned by the core independent variable, involving demographic and other control variable measurement factors (gender, age, education level, rank, socioeconomic status). In general, the survey data were representative and supportive for the research hypotheses to make reasonable inference.

4. Empirical findings

4.1. Benchmark model

Table 1 shows the sequence of the mean value of the four dimensions of public service motivation in the core variable: COM (3.47) > SS (3.38) > CPI (3.02) > APP (2.60), indicating that the public service motivation level based on COM of the respondents is the highest while that based on APP is the lowest, which is consistent with the research results of Kim (2009), Liu and Wang (2022), etc., that is, the East Asian public servants affected by traditional Confucian culture are not closely correlated with reason-based public service motivation. In addition, the mean value of submission to authority and fatalism and defensiveness is 3.23 and 2.61, respectively, which shows that grassroots Chinese public servants have a relatively high level of Confucian culture in terms of submission to authority while that in terms of fatalism and defensiveness is relatively general. On the whole, the cross-cultural applicability of public service motivation to grassroots Chinese public servants has been initially supported.

Table 2 presents the results of the benchmark model. First, from the regression results of Models (1)–(4), submission to authority is significantly correlated with public service motivation from the dimensions of APP (−0.254) and SS (0.179), and fatalism and defensiveness is correlated with public service motivation from the dimensions of APP (0.310), CPI (−0.079), COM (−0.086), and SS (−0.069), respectively, revealing that submission to authority and fatalism and defensiveness in the Confucian cultural values can explain the public service motivation of Chinese public servants, and the results strongly support H1 of this study.

Second, Table 3 shows the level of Confucian culture in 12 cities. The level of Confucian culture in different cities is different. In the measurement of the level of Confucian culture, in order to overcome the limitations of subjectivity, existing studies have constructed geographic-proximity-based Confucianism variables such as the number of Confucian colleges in provinces and regions to measure the level of Confucian culture. The results show that Chinese provinces have different levels of Confucian culture (Du, 2015; Xu et al., 2019). Some research suggest that Chinese cities have regional differences with local characteristics, which are attributed to the historical imprint of Confucian culture (Obschonka et al., 2019). For example, the Confucian culture originated in Shandong (Wei et al., 2010; Obschonka et al., 2019), Shandong thus may have a high level of Confucian culture. In addition, Jiangxi is regarded as the birthplace of neo Confucianism (Walton, 2018), and the number of Confucian colleges is the largest in China (Du, 2015). Therefore, Jiangxi may also have a higher level of Confucian culture. To sum up, the empirical results of this study further verify this conclusion, that is, different cities have different levels of Confucian culture, which also explains to some extent why countries and regions with different cultural values have different levels of public service motivation.

Third, the regression results of Model (1) show that there is a significant negative correlation between submission to authority and APP. This result is contrary to H2.1, that is, the higher submission to authority, the lower the APP level may be. The regression coefficient (0.310) of fatalism and defensiveness

TABLE 1 Descriptive statistical results of samples.

Categorical variables	Category	Code	%
Sex	Male	0	44.44
	Female	1	55.56
Age (year)	Under 30	1	36.87
	31–50	2	48.44
	Over 51	3	14.69
Education level	Below high school	1	3.99
	Junior college	2	8.70
	Bachelor	3	65.20
	Master	4	20.98
	Doctor	5	1.79
Social status (official ranks)	Section member	1	61.31
	Unit chief level	2	11.31
	Deputy section chief/Township level	3	11.68
	Section chief/Township level	4	6.20
	Deputy county/division chief level or above	5	9.49
Continuous variables	Range of values	Average	Std. D.
Economic status	1–10	5.37	2.11
PSM-APP	1–5	2.60	1.01
PSM-CPI	1–5	3.02	0.72
PSM-COM	1–5	3.47	0.96
PSM-SS	1–5	3.38	0.79
Confu-authority	1–5	3.23	0.80
Confu-self	1–5	2.61	0.91
Leader-authority	1–5	2.96	0.85
Leader-ethics	1–5	3.42	0.90
Leader-kindness	1–5	3.39	0.89

is positive and significant at the level of 0.01. This result supports H3.1, indicating that the stronger the fatalism and defensiveness is, the higher the PSM level from the dimension of APP. They are more willing to engage in public affairs based on rational motivation and contribute to their own public policymaking process.

Fourth, in the Model (2)–(3), the regression coefficient of submission to authority is insignificant, indicating that submission to authority has no effect on CPI and COM, and this result fails to support H2.2 and H2.3. The regression results of Models (2)–(3) also show that fatalism inhibits the PSM level in terms of CPI and COM, which supports H3.2 and H3.3,

TABLE 2 Confucian culture level in 12 cities.

City	Confucian-submission to authority	Confucian-fatalism and defensiveness
Shenzhen	3.11 (0.063)	2.47 (0.072)
Hangzhou	3.59 (0.061)	2.27 (0.061)
Haikou	3.21 (0.074)	2.46 (0.08)
Suzhou	3.2 (0.039)	3.04 (0.048)
Taizhou	3.2 (0.186)	3.04 (0.203)
Nanjing	3.33 (0.247)	2.74 (0.322)
Wuxi	2.91 (0.211)	2.94 (0.205)
Datong	3.44 (0.073)	2.41 (0.099)
Tianjin	3.31 (0.081)	2.51 (0.112)
Nanchang	3.68 (0.156)	2.39 (0.123)
Quanzhou	3.29 (0.11)	2.18 (0.088)
Wuhan	3.22 (0.101)	2.38 (0.097)

TABLE 3 The regression results of the influence of Confucian culture on public service motivation.

	PSM_APP	PSM_CPI	PSM_COM	PSM_SS
	(1)	(2)	(3)	(4)
Confucian culture				
Submission to authority	−0.254**	0.060	0.086	0.179**
Fatalism and defensiveness	0.310***	−0.079**	−0.086*	−0.069**
Demographic variables				
Gender	0.229	0.024	0.013	0.037
Age (year)	−0.030	−0.003	0.008	0.007
Education level	0.056	−0.107	−0.077	−0.213*
Sociological variables				
Political affiliation	0.045	−0.012	0.004	−0.032
Official ranks	0.015	0.043	−0.000	−0.027
Economic status	−0.055	0.013	0.117***	0.075**
Fixed effects (city)	Yes	Yes	Yes	Yes
Fixed effects (time)	Yes	Yes	Yes	Yes
_cons	60.757	8.846	−11.350	−9.652
N	1,221	1,117	1,128	1,128
R-squared	0.1726	0.0637	0.1489	0.1397
Adj *R*-squared	0.1090	−0.0083	0.0834	0.0735

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

that is, the stronger the fatalism and defensiveness is, the more likely it is to go beyond the values, moral constraints and public interests for personal and family interests, and the higher the CPI and COM levels are.

Fifth, the regression results of Model (4) show that SS is to a large extent positively affected by submission to authority. The more authority is submitted to, the stronger the willingness to make self-sacrifice. This is contrary to the prediction under H2.4. Model (4) also shows that fatalism and defensiveness has a significant negative impact on SS, confirming H3.4, that is, the stronger the fatalism and defensiveness is, the more attention is paid to personal interests, and it is not easy to show self-sacrifice behavior. In terms of control variables, the results of Models (3)–(4) show that the regression coefficient of economic status is significant at the level of 0.01 (0.117) and 0.05 (0.075), respectively, indicating that the higher the economic status is, the more likely it is to strengthen the willingness to improve public services due to the perception of difficulties of individuals at the "bottom" level, thus showing a high level affection-based public service motivation. In addition, the higher the education level, the lower the public service motivation in terms of SS.

4.2. The moderating effect of paternalistic leadership

The statistical results of the "moderating effect" test in Table 4 are as follows. First, the regression results of Model (11) indicated that under the moderating effect of authoritarianism, the original "main effect" of submission to authority turns to be significant, and the moderating effect (−0.162) negatively strengthens the COM level at the level of 0.05, but there is no moderating effect on the impact of fatalism and defensiveness on COM, and thus H4.3 has been partially verified. Models (5), (8), and (14) did not show significant moderating effect, and H4.1, H4.2, and H4.4 were not verified.

Second, the results of Model (7) revealed that benevolence does not have a significant moderating effect on the impact of submission to authority on APP, but shows a negative moderating effect on the impact of fatalism and defensiveness on APP, which is contrary to the prediction of H6.1. In addition, the results of Model (16) confirmed that benevolence plays a negative role in moderating the influence of submission to authority on SS. The adjustment coefficient is −0.169, significant at the level of 0.1, which is contrary to H6.4. The moderating effect between the other three dimensions of public service motivation and benevolence is not shown, and thus H6.2, H6.3, and H6.4 are not supported, indicating that the moderating effect of benevolence on the relationship between Confucian culture and public service motivation is limited.

Third, the regression results of Models (6), (9), (12), and (15) demonstrated that morality does not show a significant moderating effect, and thus H4.1, H4.2, H4.3, and H4.4 are not supported. In general, paternalistic leadership can play a part of the moderating role in the influence of Confucian culture on public service motivation, and has a specific moderating effect on the four dimensions of public service motivation affected

TABLE 4 The regression results of moderating effect of paternalistic leadership.

	PSM_APP			PSM_CPI		
	(5)	(6)	(7)	(8)	(9)	(10)
Confucian culture						
Submission to authority	−0.286	−0.601	0.060	0.319*	0.086	0.111
Fatalism and defensiveness	−0.067	0.581*	−0.079**	0.038	0.038	0.011
Regulating variable						
Authoritarianism* Submission to authority	0.014			−0.084		
Morality* Submission to Authority		0.117			−0.004	
Benevolence* Submission to authority			0.135			−0.016
Authoritarianism* Fatalism and defensiveness	0.103			−0.030		
Morality* Fatalism and defensiveness		−0.096			−0.033	
Benevolence* Fatalism and defensiveness			−0.197**			−0.019
Demographic variables						
Gender	0.224	0.216	0.201	0.031	0.024	0.029
Age (year)	−0.034	−0.026	−0.023	−0.003	−0.003	−0.003
Education level	0.052	0.032	0.080	−0.097	−0.128	−0.102
Sociological variables						
Political affiliation	0.069	0.036	0.055	−0.017	−0.011	−0.012
Official ranks	0.016	0.020	0.028	0.040	0.045	0.043
Economic status	−0.049	−0.058	−0.046	0.009	0.012	0.012
Fixed effects (city)	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects (time)	Yes	Yes	Yes	Yes	Yes	Yes
_cons	70.500	54.524	46.833	7.805	9.268	8.780
N	1,211	1,210	1,209	1,211	1,210	1,209
R-squared	0.1973	0.2083	0.2731	0.0910	0.0773	0.0655
Adj *R*-squared	0.1099	0.1221	0.1940	−0.0080	−0.0232	−0.0363
	PSM_COM			PSM_SS		
	(11)	(12)	(13)	(14)	(15)	(16)
Confucian culture						
Submission to authority	0.586**	0.504	0.382	0.392	0.355	0.702**
Fatalism and defensiveness	0.081	−0.097	0.025	0.034	−0.244	−0.186
Regulating variable						
Authoritarianism* Submission to authority	−0.162**			−0.069		
Morality* Submission to authority		−0.123			−0.055	
Benevolence* Submission to authority			−0.099			−0.169*
Authoritarianism* Fatalism and defensiveness	−0.073			−0.064		

(Continued)

TABLE 4 (Continued)

	PSM_COM			PSM_SS		
	(11)	(12)	(13)	(14)	(15)	(16)
Morality* Fatalism and defensiveness		−0.020			0.025	
Benevolence* Fatalism and defensiveness			−0.040			0.018
Demographic variables						
Gender	0.028	0.026	0.045	0.048	0.044	0.074
Age (year)	0.008	0.003	0.006	0.008	0.005	0.002
Education level	−0.060	−0.124	−0.056	−0.207	−0.216	−0.210
Sociological variables						
Political affiliation	−0.007	0.016	0.003	−0.041	−0.028	−0.033
Official ranks	−0.008	0.000	−0.004	−0.033	−0.028	−0.033
Economic status	0.109***	0.117***	0.108***	0.070	0.076**	0.064
Fixed effects (city)	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects (time)	Yes	Yes	Yes	Yes	Yes	Yes
_cons	−13.684	−4.002	−8.922	−12.160	−6.539	−1.668
N	1,211	1,210	1,209	1,211	1,210	1,209
R-squared	0.2088	0.1700	0.1732	0.1545	0.1435	0.1890
Adj R-squared	0.1226	0.0796	0.0832	0.0624	0.0502	0.1007

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

by the cultural values of submission to authority and fatalism and defensiveness, which further proves that the influence of Confucian culture on the public service motivation of Chinese public servants is different due to different paternalistic leadership styles.

5. Summary and discussion

5.1. Conclusion

Based on the perspective of cross-cultural research, this study collected data from 14 district-level government in 12 Chinese cities, and discussed the relationship between Confucian culture and public service motivation by establishing a theoretical framework. This framework involves two traditional Chinese Confucian cultures including submission to authority, and fatalism and defensiveness, respectively, testing the applicability of the four dimensions of public service motivation in China's social and cultural background. The results confirmed that (a) Confucian culture has a differentiated influence on the four dimensions of public service motivation of Chinese grassroots public servants; (b) The paternalistic leadership nurtured by traditional Chinese Confucian culture partially moderates the relationship between Confucian culture and different dimensions of public service motivation.

First, this study preliminarily confirmed that Confucian culture constitutes an important cultural value orientation of the public service motivation of grassroots Chinese public servants (H1 is supported). Moreover, different cities have different levels of Confucian culture, which is related to social history. Submission to authority has a significant impact on the PSM level (H2 is partially supported). In contrast to hypothesis H2.1, the empirical results show that submission to authority inhibits the APP level. This may be because a high degree of respect for hierarchy has a negative impact on the desire to participate in decision-making, which often leads to employees' lack of initiative in participating in decision-making (Wang et al., 2005) and creativity (Yuan and Zhou, 2015). This result may be point that a high degree of submission to hierarchy has a negative impact on the desire to participate in decision-making, which often leads to the lack of initiative of employees in participating in decision-making (Wang et al., 2005) and creativity (Yuan and Zhou, 2015). In other words, a high degree of submission to hierarchy and authority will encourage grassroots public servants to accept and follow the ideas of leaders and adopt a conservative attitude. People who at high power distance usually think that there is little value in trying to influence decisions (Begley et al., 2002). In order to maintain a harmonious relationship, they are more willing to maintain the current system order and operating rules, and give up the challenge of participating in public decision-making (Hofstede, 1980).

In addition, the empirical results are different from what we expected: the more submission to authority, the more likely individuals are to make self-dedication. This may attribute to the social respect concept of abiding by the collective interests and "the Great Way is for the sake of the public" implied in Confucian collectivism (Han and Sun, 2022). The consistent goal of national, social, organizational leaders and other authorities to improve public services helps public servants break away from external motivation and turn to the autonomous motivation of "serving the people makes me happy" (Han and Sun, 2022). Reciprocity and kindness are characteristics of highly collectivistic environment (Schwartz, 1994). Sacrificing the "individual benefit" for the sake of "great righteousness" is a virtue as well as a respectable attitude. Therefore, the higher the level of submission to authority, the stronger the public servants' commit to "serving the people" selflessly, and the higher the SS level of sacrificing personal interests to the collective interests.

Second, the effect of Confucian culture on public service motivation is not consistent. The more fatalism and defensiveness, the higher the APP level of public service motivation, and the lower the CPI, COM, and SS levels (H3 is partially supported), revealing that when facing with difficulties, setbacks, or conflicts of interest, individuals with fatalistic and defensive attitudes tend to be passive and self-interested under the influence of external control beliefs, give priority to personal interests, and refuse to make contributions, which will reduce the normative and affective public service motivation while improving the rational public service motivation.

Third, a new mechanism is proposed between Confucian culture and public service motivation by adding paternalistic leadership as a moderator. However, the current study found that the moderating effect of paternalistic leadership is limited (H4 and H6 are partially supported). Specifically, authoritarianism only plays a negative role in moderating the influence of submission to authority on COM among the influence of Confucian culture on public service motivation. The stronger the individuals' feeling about authoritarianism, the more likely they are to lower the COM level of public service motivation because of submission to authority. This reveals that authoritarian behavior will strengthen subordinates who originally respect authority to recognize and follow authoritarian leaders. However, due to the destruction of authoritarian behavior on social affections and interpersonal needs (Chen et al., 2014), authoritarian behavior reduces the subordinates' organizational citizenship behavior (Cheng et al., 2002) and the initiative to participate in altruistic public services (Tuan, 2018), leading to their PSM perception breaks from the COM dimension.

Benevolence plays a negative role in moderating the influence of submission to authority on SS. It may be that benevolence and care of benevolent leaders have established an affective bond between subordinates (Chen et al., 2014; Tuan, 2018), which makes subordinates feel intimate distance and smaller power distance, and thus highly traditional individuals reduce their fear and obedience to authority, and the role of the authority will be weakened in urging organizational members to make self-sacrifice and its accountability effect on work performance accordingly. Benevolent leaders will also reduce the impact of fatalistic and defensive attitude on APP, implying that benevolence may reduce the public servants motivation for private interests and increase their positive actions for the sake of collective interests by means of personal care, affective care, tolerance, and understanding.

Furthermore, the results also confirmed that morality may not have a moderating role in the effect of Confucian culture on public service motivation, implying that Confucian culture, embodied in different roles and identities (such as leaders and subordinates), plays an interactive role in influencing public service motivation.

The current study is an attempt of localized research, breaking through the limitations of previous research on Confucian culture, paternalistic leadership, and public service motivation confined to the holistic perspective, and taking an exploratory step in the in-depth, personalized and decomposed research on incentives for public servants. In brief, our research findings provide both theoretical and practical implications. First of all, this study has developed an innovative theoretical framework. Through empirical data, it is proved that the Confucian culture rooted in the social and historical process is an antecedent variable that affects the public service motivation of grassroots Chinese public servants, and has a positive and inhibitory effect on different dimensions of public service motivation. It not only expands the cross-cultural applicability of the theory of public service motivation in non-western countries, but also supplements the evidence of research on public service motivation in East Asian countries, and suggests that more background variables such as traditional cultural values need to be examined in public service motivation.

In practice, this study also provides meaningful insights into the personnel management of Chinese public organizations. Considering that dereliction of duty in Chinese public sectors occurs from time to time, the traditional incentive mechanism for public servants becomes inefficient and the overall morale of public organizations has been frustrated (Duan and Chen, 2021), how can we recruit employees who have an attitude of serving the public interest rather than just for personal interests into the organization? How to constantly encourage public servants to continuously engage in public services? It is necessary for the organizations to consider the importance of specific cultural values for organizational culture and personal value orientation. Moreover, the organizations should pay attention to, detect and determine which cultural values can motivate public servants to improve their public service motivation. Meet the specific needs of inducement motivation, thus enhancing organizational citizenship behavior (Zhou et al., 2023), so as to enhance organizational citizenship behavior and maintain the service consciousness of "serving the people wholeheartedly", and recruit and cultivate public employees who are consistent with the organizational culture and organizational goals. These measures may help to improve the organizational performance of the public sectors and improve public services.

5.2. Limitations and future research prospects

Although this study has made new findings on the relationship between Confucian culture and public service motivation, there are still limitations. First of all, we have selected samples from 12 Chinese cities, however, due to China's huge population, vast territory, long historical background, and differences in urban regional culture, the cross-sectional data and the sample inference may represent some cities, rather than the entire grass-roots civil servants in China. Secondly, our exploration of Confucian culture is limited. The system of Confucian culture is complex and diverse. Due to space constraints, we only selected two dimensions for the measurement, trying to preliminarily verify the relationship between Confucian culture and public service motivation. Future research can pay more attention to other dimensions of Confucian culture to further build a complete framework; though the measurement scales for public service motivation in the academic community are rich, it is necessary to continuously develop a universal scale that is more fit for the Chinese situation and reflects cultural utility to enhance the explanatory power of the results and the applicability of cross-cultural scenarios. Last, from the P-O fit and the interactionist perspective, due to the complementarity and consistency between people and organizations (Muchinsky and Monahan, 1987; Kristof, 1996), individuals will maintain the organizational culture in order to maintain consistency with the organization, while employees with high public service motivation are usually reluctant to leave their work organizations (Bright, 2007). Therefore, these employees with higher levels of public service motivation will gather together to gradually form an organization's macro background and cultural atmosphere until people and the organization are complete with each other (Bright, 2007). In other words, organizations with strong public service motivation may form a collective cultural atmosphere, and there may be endogenous problems of reverse causation. However, this study believes that SDT, P-O fit, and PSM process theory still largely support that cultural values are the antecedents of public service motivation. On the one hand, compared with PSM, the historical and cultural values of a country as a variable are more difficult to change, and the cultural background profoundly affects the socialization of individuals (House et al., 2004). PSM is root in the process of socialization (Perry, 1997, 2000; Moynihan and Pandey, 2007; Perry and Hondeghem, 2008; Corduneanu et al., 2020), and cultural values have been proved to be the pre-factor affecting the level of PSM (Anderfuhren-Biget, 2012; Vandenabeele, 2014; Lee et al., 2020; Kim and Torneo, 2021). On the other hand, existing studies argue that employees' values were formed before they entered the organization (Perry, 1997; Ritz and Brewer, 2013), and the impact of the work environment is secondary to the process of socialization (Ritz and Brewer, 2013). Of course, the two-way causal problem between the two still needs to be considered, especially the limitations brought by cross-sectional data. Our future's research will conduct feasible experimental design or quasi experimental design to strictly infer the effect mechanism of Confucian culture on public service motivation, and expand the research samples in the central and western regions in China to improve the external validity of inference.

Data availability statement

The original contributions presented in this study are included in this article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

CD contributed to the empirical work, analysis of the results, and writing of the first draft. JJ, CZ, and YL supported the total work of CD. JJ, CZ, and YL revised and supervised the manuscript. All authors contributed to the article and approved the submitted version.

Conflict of interest

YL was employed by company Shenzhen Bao'an International Airport, Shenzhen, China.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The impact of value co-creation on consumer citizenship behavior: Based on consumer perspective

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This research investigated the value co-creation behaviors in livestreaming platforms and the internal mechanism of perceived value on consumer value co-creation behavior on the short-video platform TikTok. This research selected the Tiktok platform as the research object, and uses structural equation model to analyze consumer data. The results indicated that consumer-perceived value mediates the relationship between consumer engagement and citizenship behaviors. In addition, short-video platforms exhibit significant community attributes, and interactive behavior forms the primary part of consumer engagement that enhances the perceived value. Consumers join short-video platforms to look for communities that interest them. Consumers' responses generate the perceived value. Thus, it enhances consumers' intentions to continue using a particular service, which then increases the likelihood of citizenship behavior. This study also found that consumers' creative behavior in short-video platforms embodies social and functional values. This suggested that consumers of livestreaming and short-video platforms such as TikTok tend to seek social recognition by sharing their opinions or daily lives. The examination of the mediating role of perceived value on the relationship between consumer engagement behavior and citizenship behavior revealed that perceived value significantly mediated the relationship between consumer engagement behavior and citizenship behavior. This provided evidence of the fact that consumers usually actively participate on the platform by uploading content and sharing their creations, with the motivation to generate significant social impact and gain the recognition of others. Firstly, TikTok's consumers deeply engage on platforms in which their cognitive messages are integrated into the platform through interacting with others, browsing, and creating short videos. Secondly, TikTok provides a channel with high level of interactivity that facilitates social interaction among strangers. Video uploaders and fans develop positive interactive relationships. Thirdly, TikTok viewers may become video providers at some point; the act of co-creation creates economic value for the platform and generates emotional, functional, and social values for its consumers.

KEYWORDS

consumer engagement behavior, consumer citizenship behavior, value co-creation, consumer perceived value, livestreaming platforms

Introduction

Livestreaming platforms are playing an increasingly important role in real life. With the increasing popularity of mobile devices and Internet technologies, livestreaming platforms break the limits of space and time, and meet consumers' needs for various types of content consumption that evolve from images and texts to videos. Given the low threshold for creation, the fragmented features, and personalized recommendations, livestreaming platforms have been expanding rapidly (Wang and Liyao, 2019). A survey of social media consumers in 11 countries conducted by the Pew Research Center, a U.S. pollster, revealed that an average of 69% of mobile phone consumers take videos in which 47% of them upload these videos on social media platforms. The consumer size of short-video-based social media platforms is growing rapidly worldwide, ranking the third in global social applications in terms of consumer size (Agrawal et al., 2015; Lee and Watkins, 2016; Khan, 2017). In addition, short videos are easy to produce and widely accepted, thus they unleash the potential for consumer-created content. Therefore, short-video-based social media platforms have been regarded as the next most promising sector for content.

Consumers' value co-creation occurs during the process of utilization of short-video platforms. Consumers create value by producing, posting and watching short videos, giving likes, providing comments, and replying to messages. Specifically, a video uploader produces and uploads a short video on a social media platform. And then, viewers of the video interact with the uploader in various ways, such as giving likes and comments to the video. In this process, the uploader achieves self-expression and interaction and experiences positive emotions. In the meantime, the viewers receive informative value from the video content. Once the viewers follow the uploader, interaction occurs which gives raise to other social opportunities between them. The platform gains consumer stickiness and economic value simultaneously (Wang and Liyao, 2019). Since uploaders and viewers are the consumers of short-video platforms, their interaction can be seen as the co-creation of consumer value. From the perspective of consumer psychology, consumers can perceive a sense of efficacy of psychological ownership, self-identity, and spatial demand in the process of value co-creation, which can enhance consumers' loyalty to the brand under the effect of consumer engagement (Gao et al., 2022).

Livestreaming platforms have embodied a significant impact worldwide. However, little academic attention was paid to this topic. Besides, the value co-creation mechanism in livestreaming platforms was not extensively investigated. The extant studies mainly examine content co-creation through the lens of value co-creation between companies and consumers, rather than the value co-creation between individuals. For instance, Zhang et al. (2020) recognized the importance of value co-creation in social media, but they mainly focused on that between companies and consumers. Moreover, few studies verified the importance of livestreaming platforms as the digital brand community in value co-creation.

From the perspective of direct consumer engagement in livestreaming as a social practice, both livestreaming platforms and content creation diffuse the scope of practice through their respective social practice paths on one side, allowing changes in how and what consumers practice (Echeverri and Skalen, 2011), it also reinforces the practice model while consumer engages in the livestreaming process (Snyder et al., 2017). As a result, diverse paths of practice are applied within the period in which consumers are engaged, and the implications of consumer engagement in livestreaming practices are fulfilled. This framework demonstrates consumer citizenship behavior that upholds the image of livestreaming platforms (Warde, 2014). Consumer citizenship behavior is a voluntary and discretionary behavior that contributes to the entire service organization (Groth, 2005), it pertains to the acts in which individuals share positive reviews and comments regarding their experiences through online platforms. These creative ideas contribute to improving service processes and experiences (Assiouras et al., 2019). In the context of online channels, consumer citizenship behavior even helps to induce electronic word of mouth (eWOM) and promote consumer-generated content which can then enhance the competitiveness of organizations (Anaza, 2014). As such, on short-video social media platforms where consumer-generated content forms the core elements, consumer citizenship behavior that is highly relevant to consumer engagement is expected to play a vital role.

Based on the aforementioned practical and theoretical background, this study investigates the livestreaming platform TikTok from the perspective of consumers, builds a conceptual model based on relevant literature and practical analysis, and analyzes real consumer data of TikTok using structural equation modeling (SEM). Since little literature focuses on the value co-creation mechanism of livestreaming platforms, this paper intends to provide an essential theoretical contribution to the study of the value co-creation mechanism of consumers and fill the gap in the research on value co-creation theory in the livestreaming economy. From a practical point of view, this study provides valuable suggestions for improving and optimizing the consumer experience of short-video platforms.

Literature review and research hypotheses

Value co-creation behavior

Consumer value co-creation behavior refers to consumers' actual engagement behavior in value co-creation. The focus of value co-creation research is on the means to motivate consumers' value co-creation behavior. Monetary incentives have received the most academic attention (Mertins and Walter, 2021). Previous research revealed that more monetary incentives provided to consumers' value creation facilitate more content creation (Sun et al., 2017). However, the behaviorist motivation theory suggests multiple ways to motivate consumer behavior. In addition to the monetary incentives, consumers' actual needs including their social and functional needs and emotional needs should be considered as well. Moreover, an in-depth analysis of public material and emotional needs to align each individual's needs with the organization's goals is needed. In addition, previous studies did not analyze the specific classification of consumer value co-creation behavior or the specific problems in a case-by-case manner.

Consumer value co-creation behavior is generally classified into consumer engagement behavior and consumer citizenship behavior (Yi and Gong, 2013). Consumer engagement behavior refers to the behavior that consumers must take in the process of producing and providing services to align with the company's expectations of the services. Consumer engagement behavior involves four dimensions: information seeking, information sharing, responsible behavior, and individual interaction (Yi and Gong, 2013). Consumers interact with providers in the service process by seeking and sharing information, this interaction creates value. Consumers can be psychologically satisfied in the engagement process (Dabholkar, 2015), and such a process is a necessary role-based behavior for the success of value co-creation. McColl-Kennedy et al. (2017) suggested that consumer value creation may positively affect consumer well-being.

Consumer citizenship behavior is evolved from organizational citizenship behavior and is characterized by the partial role that consumers act as employees in interactions regarding service production and delivery. Consumer citizenship behavior is defined as behavior that is spontaneously and independently determined by consumers, not based on the service itself (Groth, 2005). Consumer citizenship behavior can be divided into four dimensions: feedback, defense, assistance, and tolerance (Yi and Gong, 2013). Consumers may actively disseminate reputation, behave in a manner with patience, tolerance, and courtesy in service, make reasonable suggestions to improve service, and help other consumers (Revilla-Camacho et al., 2015). Consumer citizenship behavior is an extra-role behavior that is not necessary for value creation, while it is a resource for companies to gain a competitive advantage (Paine and Organ, 2000). Thus, it can be seen that consumer engagement behavior and consumer citizenship behavior are apparently instrumental in value co-creation (Yi and Gong, 2013). However, few studies have specifically explored the intermediate mechanisms of their interactions to further the investigation of consumer value co-creation (Wang and Liyao, 2019).

Given the neglect of different types of value co-creation behaviors in previous studies, this study investigates the consumers' value co-creation behaviors in the livestreaming industry based on consumer engagement behavior and consumer citizenship behavior. It not only deepens the understanding of consumer value co-creation behavior, but also offers an important theoretical supplement to the research in this area.

Consumer-perceived value

In traditional management research, especially in marketing domain, scholars have been interested in the objective value of products. Consumer-perceived value has been received little attention in the relevant research for a long time. However, Ganassali and Matysiewicz (2021) suggested that consumer-perceived value presents a significant impact on companies and brands. Consumer-perceived value is a norm in which consumers measure commodity value, it is a subjective and personalized evaluation by consumers based on their emotions toward the quality and delivery of a commodity (Hapsari et al., 2016). Consumer-perceived value is an essential component in companies and has become one of the most important indicators for measuring business performance (Martelo et al., 2013). The perceived value is defined by consumers and depends on the context, time, and place. It is interaction-based and empirical means, emphasizing value on consumption rather than purchase (Meloni and Swinnen, 2021). In the meanwhile, the perceived value presents subjective and personalized characteristics. For this reason, its specific dimensions should be determined from the perspective of the product or the consumer (Holbrook and Hirschman, 1982). Therefore, this paper emphasizes consumer-perceived value, from the view of the subjective nature of short-video content co-creation and individual differences.

Consumer-perceived value comprises several interrelated dimensions that constitute the overall perception of value (Sanchez-Fernandez and Iniesta-Bonillo, 2007). Currently, there are several ways to classify consumer-perceived value. It includes two-dimensional classification as utility value and hedonic value (Chang and Tseng, 2013); three-dimensional classification as functional value, emotional value, and social value (Holbrook and Hirschman, 1982); four-dimensional classification of functional value, emotional value, social value, and perceived cost (Sweeney et al., 1997); and five-dimensional classification of functional value, emotional value, social value, cognitive value, and associative value (Sheth et al., 1991). In terms of the most recognized classification in the current literature on value co-creation theory, consumer-perceived value is categorized into emotional, functional, and social values (Smith and Colgate, 2007).

Although relevant research gradually attaches importance to consumer-perceived value, this paper considers the following shortcomings in previous studies. Firstly, related studies of content co-creation on short-video platforms failed to examine the core concept of consumer-perceived value. Secondly, research on the impact of consumer-perceived value is conducted from a relatively singular perspective. Specifically, related studies did not investigate the relationship between consumer-perceived value from emotional, functional, and social dimensions; consumer engagement; and consumer citizenship behavior. Finally, previous studies neglected consumer-perceived value on consumer behavior that contributes to companies' long-term developments. From the perspective of enterprises, consumer citizenship behavior is highly conducive to the sustainable operation and healthy development of short-video-based social media platforms. Based on the characteristics of short-video platforms in the value co-creation process, this study divided consumer-perceived value into emotional value, functional value, and social value and addressed the current research questions in the context of consumer engagement behavior and consumer citizenship behavior.

Consumer engagement behavior and consumer-perceived value

Consumer engagement behavior refers to the consumers' behavior associated with the production and delivery of services (Greenwald and Conover, 2014) and is critical for platforms to foster and enhance consumer experience (Wang and Lee, 2020). The consumer engagement behavior of short-video platforms can be classified as browsing, interaction, and creation. Specifically, browsing behavior consists of reading text, watching, searching, and saving short videos. Interactive behavior involves giving likes, providing messages, commenting, replying, and reposting. Creative behavior refers to producing and uploading short videos, and participating in activities on platforms (Dai and Gu, 2017). On short-video platforms, a video uploader creates and uploads a video. Once the video is approved, it will then be recommended to viewers. Viewers will present interactive behaviors, including giving likes and comments, viewing the video uploader's profile, and following the uploader. In this process, the uploader, the platform, and the viewers complete value co-creation (Wang and Liyao, 2019). The created value is consumer-perceived value.

Perceived value is a comprehensive evaluation based on the psychological perception that consumers experience from a commodity or service, examples of the psychological perception can be given as psychological gains and losses, monetary, and time costs (Martelo et al., 2013). Given that perceived value can be classified as emotional, functional, and social (Chang and Dibb, 2012), when using short-video applications, consumers usually perceive two different values simultaneously. For instance, consumers may feel joy, fun, and happiness. Since studies found that consumers' perceived emotional value leads to higher product loyalty (Yeh et al., 2016), such perceptions are crucial elements that should be focused. Functional value refers to the value provided by the platform as a tool (Lee et al., 2014). The short-video platform is not only a tool for entertainment, but also it acts as an important tool for consumers to get access to information. Functional value co-creation occurs when consumers access and share messages, record their life experiences or information, and learn knowledge or skills.

As for social value on short-video platforms, social value refers to the effectiveness of enhancing consumers' self-perception in society (Jahn and Kunz, 2012). In the context of short-video platforms, consumers can get acquainted to individuals with the similar values and interests and gain followers. This function fully satisfies consumers' real-world social needs in the virtual network space, which enables the co-creation of social values. Different video content, behaviors including liking and commenting allow consumers to perceive themselves as being engaged in the co-creation of emotional value, functional value, and social value. For example, videos with content of life skills offer consumers practical support. Videos with a humorous tone and content with dance possess entertainment value. Therefore, it is believed that the core concept of consumer-led value co-creation theory fit the process of consumers' use of livestreaming platforms. The similar statement provided by Wu and Qijie (2017) revealed that consumers are permanent co-creators of value, and consumer engagement is a prerequisite for value creation. In consumer engagement, consumers can satisfy their own needs and benefit from the social relationships they build (Gummerus et al., 2012).

From the above-mentioned analysis of consumer-perceived value during using short-video platforms, it is believed that consumer-perceived value, including emotional value, functional value, and social value, originates from the engagement behavior during the process of using short-video platforms. Consumers' engagement behavior can contribute to their perceived value, in which interactive and creative behaviors positively influence the perceived value. Browsing behavior positively affects the perceived functional value (Dai and Gu, 2017). Although related studies fail to directly investigate the relationship between the use of short-video platforms and perceived value, several studies provide an important theoretical basis for the hypotheses in this paper. Wise et al. (2010) suggested that consumers obtain more positive emotions while using short-video platforms. Yan et al. (2019) found that a group effect occurs when consumers' emotions are affected by short videos on social media platforms. For example, short videos of major public health events often stimulate empathy among consumers, which then leads to social value co-creation. In addition, consumers of short-video platforms gain extra pleasure and satisfaction through self-expression and interaction. Such emotions create a positive emotional bond between consumers and the video, which enhances perceived value (Hsu and Lin, 2016). Since this study classifies short-video platforms' consumer-perceived value into emotional, functional, and social value, the following hypotheses were proposed accordingly:

> *H1a*: Browsing behavior positively influences the enhancement of emotional value.
>
> *H1b*: Interactive behavior positively influences the enhancement of emotional value.
>
> *H1c*: Creative behavior positively influences the enhancement of emotional value.
>
> *H2a*: Browsing behavior positively influences the enhancement of functional value.
>
> *H2b*: Interactive behavior positively influences the enhancement of functional value.

> *H2c*: Creative behavior positively influences the enhancement of functional value.
>
> *H3a*: Browsing behavior positively influences the enhancement of social value.
>
> *H3b*: Interactive behavior positively influences the enhancement of social value.
>
> *H3c*: Creative behavior positively influences the enhancement of social value.

Consumer-perceived value and citizenship behavior

Once consumers are aware that the value gained from the engagement behavior outweighs the costs, they will become highly satisfied, which enhances their citizenship behavior. In this case, consumers may fully demonstrate their expertise and problem-solving skills in the virtual community, and obtain popularity and satisfaction. This can further enhance consumers' self-efficacy and facilitate active engagement in value co-creation (Nambisan, 2002). In the context of online shopping, the perceived value may have an impact on various consumers' citizenship behavior through consumer satisfaction and consumer commitment (Jing, 2015). Furthermore, existing studies stated that perceived value such as benefits of learning, hedonism, socialization, and dignity significantly affect consumer citizenship behavior (Zheng et al., 2013; Balaji, 2014). On the basis of these theoretical discussions, this study hypothesized that perceived value positively impacts citizenship behavior. The hypotheses are described below:

> *H4a*: Emotional value positively influences the increase of citizenship behavior.
>
> *H4b*: Functional value positively influences the increase of citizenship behavior.
>
> *H4c*: Social value positively influences the increase of citizenship behavior.

Consumer engagement behavior and consumer citizenship behavior

Consumers act as both consumers and content producers on social media platforms (Van Doorn et al., 2010). The switch between these two roles gives raise to value co-creation, which positively influences consumer behavior, namely citizenship behavior (Fan et al., 2015). Active consumers of short-video platforms may interact intensively with other consumers through producing and viewing lively and interesting content, which, in turn, promotes positive affective experiences (Hollebeek, 2011), useful knowledge, and social recognition of consumers (Yi et al., 2013). In this context, positive experiences are relevant to the emotional, functional, and social value that consumers derive from the platforms (Zhang et al., 2017). The positive social circumstance generated from interactions provides favorable conditions and potential for citizenship behavior, which contribute to facilitating consumer citizenship behavior (Jung and Yoo, 2017). According to the existing research, the perceived value mediates the value co-creation. Since consumer-perceived value is a form of feedback on consumer behavior that can improve consumer citizenship behavior, this study investigated the value co-creation behavior in livestreaming platforms, and regarded perceived value as a mediating variable. Therefore, the following hypotheses were proposed on the basis of consumer-perceived value as a mediating variable:

> *H5*: Perceived value mediates the relationship between engagement behavior and citizenship behavior.
>
> *H5a*: Emotional value mediates the relationship between engagement behavior and citizenship behavior.
>
> *H5b*: Functional value mediates the relationship between browsing behavior and citizenship behavior.
>
> *H5c*: Social value mediates the relationship between browsing behavior and citizenship behavior.
>
> *H5d*: Emotional value mediates the relationship between browsing behavior and citizenship behavior.
>
> *H5e*: Functional value mediates the relationship between browsing behavior and citizenship behavior.
>
> *H5f*: Social value mediates the relationship between interactive behavior and citizenship behavior.
>
> *H5g*: Social value mediates the relationship between interactive behavior and citizenship behavior.
>
> *H5h*: Functional value mediates the relationship between creative behavior and citizenship behavior.
>
> *H5i*: Social value mediates the relationship between creative behavior and citizenship behavior.

Based on the related theories, a mechanism of consumer value co-creation behavior of short-video platforms in the context of livestreaming was built in this study (Figure 1). The model explains the intrinsic relationship between consumer engagement behavior and citizenship behavior, in which the consumer value creation process acts as a mediator.

Research design

Data collection

The short-video industry has been growing rapidly in China, the volume of short-video consumers has reached 960 million, which indicates that 7 out of 10 Internet consumers use short-video applications. TikTok, a typical livestreaming platform in short-video communities, has more than 1 billion domestic and international consumers in 2022. Due to the social interaction characteristics of TikTok, the respective consumer behavior is highly representative. As such, consumer behavior on TikTok was chosen as the research object in this study. A questionnaire targeting TikTok consumers was distributed to 1,696 respondents through Wenjuanxing, an online data collection platform. 1,588 questionnaires with valid responses were recovered, indicating a response rate of 93.6%. Table 1 shows the demographic profile of the valid sample.

Scale design

This study explored the value co-creation theory and behaviorist motivation on livestreaming platforms. With the support of previous studies, a questionnaire was designed to meet the actual needs and characteristics of the respondents. Specifically, scales of the questionnaire were designed based on the study of consumer browsing, interaction, and creative behaviors commenced by Dai and Gu (2017; Table 2). The measurement of consumer emotional, functional, and social values was based on the questionnaires conducted by Zhang et al. (2017). Consumer citizenship behavior was measured based on the research by Yi et al. (2013). All items were measured using a 7-point Likert scale (from "strongly disagree" to "strongly agree").

Theoretical model and empirical analysis

In this study, structural equation modeling (SEM) was used to examine the research hypotheses. According to the two-step approach, the measurement model was examined to test its reliability and validity before evaluating SEM. SPSS 24.0 was applied to illustrate the population characteristics of the sample and its reliability (Cronbach's alpha) through descriptive analysis. AMOS 23 was used to verify the validity of each factor, and SEM was performed to test the proposed hypotheses. Maximum likelihood estimation (MLE) was performed to estimate the relevant model parameters. The evaluation criteria of SEM vary; the normalized fit index (NFI) and the root mean square error of approximation (RMSEA) are the indexes generally used by scholars. When NFI is greater than 0.9 and RMSEA is less than 0.05, the model is considered to fit well. If the figure lies between 0.05 and 0.08, it means that the model is acceptable. The critical value of the comparative fit index (CFI) is 0.9 (the higher the better), the

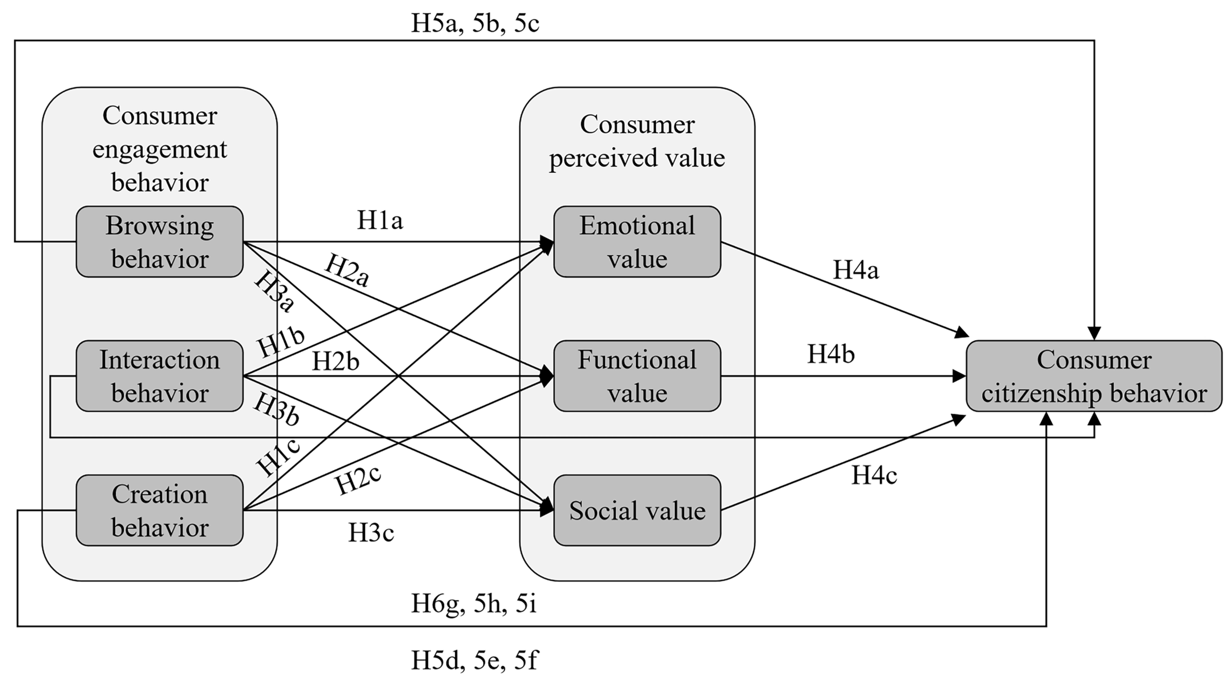

FIGURE 1
Theoretical model.

TABLE 1 Demographic characteristics (N=1,588).

Demographic data		Frequency	Percentage (%)
Gender	Male	739	46.54%
	Female	849	53.46%
Age	Under 18 years old	56	3.53%
	18–30 years old	861	54.22%
	31–40 years old	468	29.47%
	41 years old or above	203	12.78%
Educational background	Undergraduate student	309	19.46%
	Bachelor's degree	1,115	70.21%
	Master's degree and above	164	10.33%
Time of use	Within 3 months	300	18.89%
	3–6 months	470	29.6%
	7–12 months	472	29.72%
	12 months or more	346	21.79%

critical value of MC is 0.85 (the higher the better), and the critical value of RMSEA is 0.08 (the smaller the better). For the Chi-square-to-freedom ratio, the lower the value, the better the model effect.

Validity and reliability of the scales

The Cronbach's alpha for each scale was between 0.809 and 0.887, which exceeded the critical value of 0.70. Therefore, these data were considered as reliable data (Table 3). In addition, the latent variables' composite reliability (CR) ranged from 0.811 to 0.889, which is greater than the recommended minimum critical value of 0.70. Therefore, the scales used in this study had good internal consistency. The validity measures in this study consist of convergent validity and discriminant validity. Table 2 indicates that the standardized factor loadings for all measured elements ranged from 0.696 to 0.889 which are greater than 0.6. Consequently, all elements were statistically significant. Since the average variance extracted (AVE) values ranged between 0.588 and 0.713 (Table 3), all variables had good convergent validity (Fornell and Larcker, 1981). In addition, the square root of the AVE of the latent variables was greater than the correlation coefficient, specifically generally greater than 0.5 (Table 4). Thus, the adopted scales had fairly excellent discriminant validity.

Structural equation model testing

The analysis of covariance structures explored the structural relationships between the latent variables, and the results of the fits were as follows. x^2 =971.947, df = 359, RMSEA = 0.033, GFI = 0.946, AGFI = 0.935, CFI = 0.920, NFI = 0.880, NNFI = 0.913, IFI = 0.921. The figures reached the recommended thresholds, indicating that the fit level of the hypothesized model and the data were acceptable. The results of hypothesis testing are shown in Figure 2 and Table 5. Hypotheses H1b, H2a, H2b, H2c, H3b, H4a, H4b, and H4c were supported for this study. H1a, H1c, and H3a were rejected.

Consumers' browsing and creative behaviors do not present significant effect on their emotional value. TikTok consumers' browsing and creating behaviors tend to emphasize their expression of experiences and works, rather than the interactions with other consumers. This result is consistent with Fredrickson's psychological theory that emotional value is derived from human contact and interaction. Moreover, browsing behavior had little influence on social value, while creating and interactive behaviors were more important (Frederickson, 1998). Acar et al. (2021) argued that social value represents people's desire to be recognized and their sense of belonging to society through certain behaviors. However, in browsing behavior among TikTok consumers, consumers merely browsed short videos or watched other consumers' livestreaming shows without generating direct value to gain recognition from others or society.

Hypothesis testing

The mediator effect exists once the direct path coefficient between the independent variable and the dependent variable becomes smaller by adding an indirect path to the model (Kuo and Feng, 2013). This study tested nine mediator effects using the bootstrap method, which is consistent with the method applied in the relevant research (Hayes, 2013). Table 6 shows that the estimated functional value for the effect of browsing behavior on citizenship behavior was 0.062, and the 95% confidence intervals of the bias correction approach and the percentile approach did not contain 0. Thus, the mediator effect was valid, and H5b was supported. The estimated emotional value and social value of the effect of browsing behavior on citizenship behavior were 0.003 and

TABLE 2 Measurement items.

Dimension	No.	Description
Browsing behavior	BB1	I often watch popular short videos recommended on short-video platforms.
	BB2	I often watch full short videos on short-video platforms.
	BB3	I take the initiative to search for short videos that I am interested in on short-video platforms.
	BB4	I often add/save short videos that I think are worth watching on short video platforms to my favorites.
Interactive behavior	IB1	I often give likes to short videos uploaded by others on short-video platforms.
	IB2	I often comment on short videos uploaded by others on short-video platforms.
	IB3	I often reply to other consumers' comments on short videos I upload on short-video platforms.
Creative behavior	IB4	I often repost short videos uploaded by friends on short-video platforms.
	CB1	I often post my own short-video creations on short-video platforms.
	CB2	I often participate in activities on short-video platforms, such as imitation contests and challenges.
	CB3	I often produce videos using the effects of short-video platforms, such as filters, music, and clips.
Emotional value	EV1	I feel accepted when my friends/followers interact with me.
	EV2	I feel relaxed when I use short-video platforms.
	EV3	I feel delighted when I use short-video platforms.
	EV4	I like to use short-video platforms.
Functional value	FV1	I believe I can share something on short-video platforms.
	FV2	I believe I can acquire something on short-video platforms.
	FV3	I believe I can record something on short-video platforms.
	FV4	I believe I can learn knowledge/skills on short-video platforms.
Social value	SV1	I believe I can meet people/gain more followers on short-video platforms.
	SV2	I believe I can defend my friends/followers on short-video platforms
	SV3	I believe I can increase my reputation and visibility on short-video platforms
	SV4	I believe I can impress others by using short-video platforms
	SV5	I believe I can be recognized by others by using short-video platforms
consumer citizenship behavior	CCB1	I will recommend to my friends or relatives to use short-video platforms.
	CCB2	I will share short videos that interest me through other social media platforms.
	CCB3	I will make positive comments on short-video platforms.
	CCB4	I will tolerate recommended videos that I dislike on short-video platforms.
	CCB5	I will initiate suggestions for improvements on short-video platforms.
	CCB6	I will respond positively to requests from other consumers on short-video platforms.

0.011, respectively, and the 95% confidence intervals of the bias correction approach and the percentile approach contained 0. Therefore, the mediator effect was invalid, H5a and H5c were not supported. For the effect of interactive behavior on citizenship behavior, the estimates of emotional value, functional value, and social value were 0.107, 0.080, and 0.120, respectively. The 95% confidence intervals for the bias correction approach and the percentile approach did not contain 0. Therefore, the mediator effect was valid, and the result supported H5d, H5f, and H5e. The estimated functional and social values in the effect of creative behavior on citizenship behavior were 0.063 and 0.119, respectively, and the 95% confidence intervals of the bias correction approach and the percentile approach did not contain 0. Therefore, the mediator effect was valid, and H5h and H5i were supported. The estimate of emotional value in the effect of creative behavior on citizenship behavior was 0.010, and the 95% confidence intervals of the bias correction approach and percentile approach contained 0. Thus, the mediator effect was invalid, and H5g was not supported. The judgments were made on the basis of an analysis conducted by Son et al. (2016) which explored the characteristics of social network sites' citizenship behavior in terms of consumer value.

The results showed that the mediating effect of emotional value in the relationship between browsing behavior and citizenship behavior was not significant, as such the effect between creating behavior and consumer citizenship behavior was invalid. As a livestreaming and short-video platform, TikTok is featured with social attributes that allow consumers to communicate and interact with others. However, browsing behavior and creating behavior tend to be consumers' individual behaviors that do not directly involve communication or interactive activities. In psychological studies, emotional value is considered to be generated by direct contact (Visintin et al., 2017). For this reason, this study

TABLE 3 Cronbach's alpha, CR, factor loading, and AVE.

Dimension	No. factor loading		T-value Cronbach's alpha		CR	AVE
Browsing behavior	BB1	0.825		0.882	0.883	0.655
	BB2	0.741	31.872			
	BB3	0.857	38.092			
	BB4	0.81	35.761			
Interactive behavior	IB1	0.778		0.891	0.85	0.588
	IB2	0.741	28.759			
	IB3	0.834	31.761			
	IB4	0.708	27.429			
Creative behavior	CB1	0.773		0.852	0.854	0.662
	CB2	0.776	30.554			
	CB3	0.886	31.758			
Emotional value	EV1	0.788		0.88	0.882	0.653
	EV2	0.752	31.744			
	EV3	0.758	32.048			
	EV4	0.922	38.749			
Functional value	FV1	0.772		0.893	0.895	0.682
	FV2	0.761	31.604			
	FV3	0.846	35.831			
	FV4	0.916	38.498			
Social value	SV1	0.866		0.902	0.902	0.65
	SV2	0.839	41.752			
	SV3	0.835	41.4			
	SV4	0.741	34.471			
	SV5	0.74	34.392			
Consumer citizenship behavior	CCB1	0.852		0.902	0.903	0.609
	CCB2	0.697	31.186			
	CCB3	0.767	35.704			
	CCB4	0.859	42.414			
	CCB5	0.743	34.086			
	CCC6	0.75	34.56			

CR, composite reliability; AVE, average variance extracted.

innovatively verified that emotional value adequately mediated the relationship between interactive behavior and citizenship behavior. TikTok consumers' interactive behaviors are considered as sharing and communicating with other consumers, for example, sharing thoughts, works, and feelings among consumers. The emotional value enhanced from these interactions promotes the citizenship behavior of TikTok consumers. However, the path coefficient of the mediator effect of social value between browsing behavior and citizenship behavior was insignificant. It was found that TikTok consumers usually desire to receive likes and comments from others and eventually be recognized by others and society in their field of interest through their short video. However, browsing behavior at this stage failed to generate significant values. This finding differs from the results of the study by Yang et al. (2020) which stated that the pursuit of social value serves as the key driver of consumer citizenship behavior. The rational explanation could be that organizational citizenship behavior was explored under the effect of altruism and observed practice, rather than individual behavior in the context of social networks. The functional value and social value have a significant partial mediating role in the relationship between creative behavior and citizenship behavior. Creating behavior is the most important consumer behavior in short-video platforms, and its core attribute is the community. TikTok consumers create original short videos to promote the platform's operation and launch community activities to obtain recognition. In this way, consumers fully experience the entertainment and glory associated with TikTok. To sum up, the results of this study indicated that perceived value mediated the relationship between consumer engagement and citizenship behavior, and value creation is the main factor in consumer behavior.

Conclusion and discussion

Research conclusion

This study conducted hypothesis testing through structural equation modeling, and drew the following conclusions. Firstly, among the engagement behaviors, only interactive behavior significantly enhances consumers' perceived emotional value, while browsing behavior and creating behavior have few effects in this regard. Secondly, all three engagement behaviors improve consumers' perceived functional value of livestreaming platforms. In this case, consumers engage in the value co-creation process on livestreaming platforms by interacting with others, browsing, and creating short videos, and consumers are confident in their ability to share, access, and record the information on livestreaming platforms. Thirdly, browsing behavior fails to contribute to consumers' perceived functional value as it only occurs at a superficial level of quick message screening, while other interactions, such as creating behaviors, can deepen the perceived social value. Finally, the enhancement of all three perceived values positively affects the consumer citizenship behavior on the platform. Meanwhile, the perceived value has a significant influence as a mediator. However, emotional and social values do not mediate the paths from browsing behavior to consumer citizenship behavior and from interactive behavior to consumer citizenship behavior. Findings are partially aligned with previous studies. The reason could be that this paper explores the mediating effect of perceived value over consumer behavior and engagement, while previous studies usually consider perceived value as an antecedent variable. Additionally, related work by Son et al. (2016) that examined citizenship behavior in social networks merely from the view of social capital theory failed to consider the effect of value from a more comprehensive framework. This paper extends the relevant literature in social media by considering engagement behaviors and consumers' perceived value from various aspects.

This paper also finds that the creating behavior of consumers in short-video social media platforms tends to be highly

TABLE 4 Discriminant validity.

	Consumer citizenship behavior	Social value	Functional value	Emotional value	Creative behavior	Interactive behavior	Browsing behavior
Consumer citizenship behavior	0.780						
Social value	0.607	0.806					
Functional value	0.643	0.604	0.826				
Emotional value	0.525	0.476	0.497	0.808			
Creative behavior	0.477	0.542	0.505	0.234	0.814		
Interactive behavior	0.436	0.524	0.518	0.489	0.408	0.767	
Browsing behavior	0.416	0.321	0.507	0.214	0.421	0.340	0.809

The values on the diagonal are the roots of the dimensional AVE.

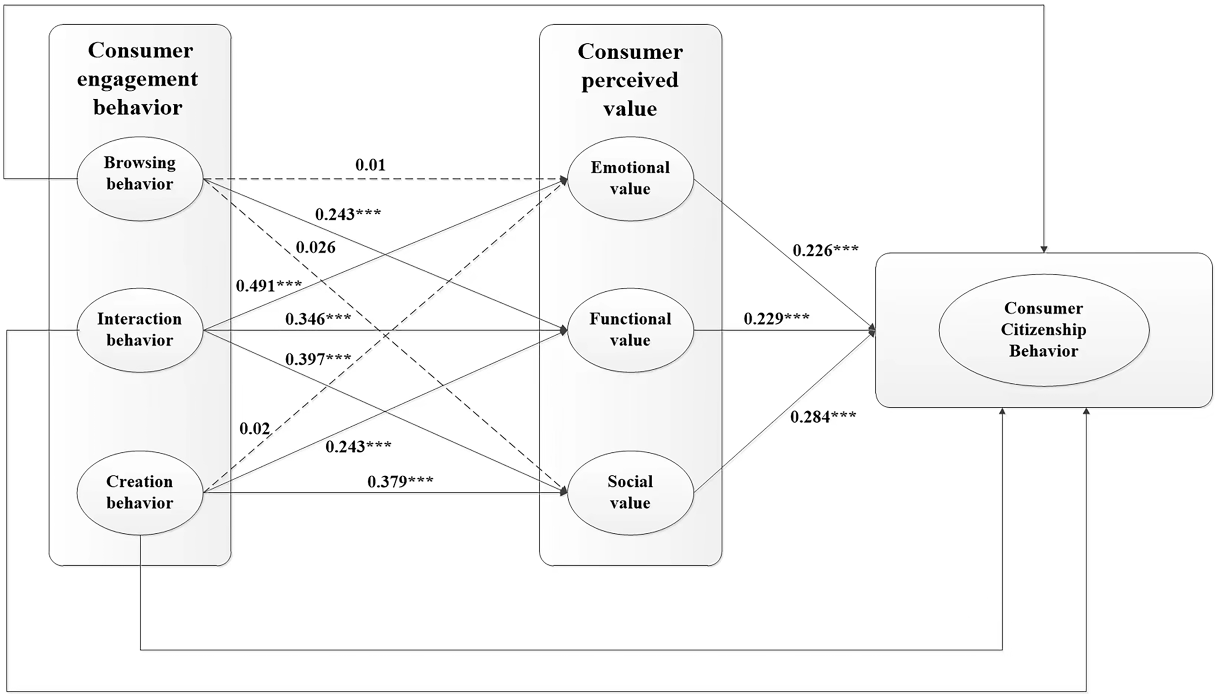

FIGURE 2
Model results. Significant levels *p<0.05, **p<0.01, ***p<0.001.

associated with social and functional values. Hence, consumers of short-video social media platforms seek social recognition by sharing their views. Functional value and social value among consumers are the two key drivers that promote citizenship behavior. They are also the core values pursued by the consumers of short-video social media platforms. This finding is consistent with the results of Yang et al. (2020) that motivation of social value is the driving factor citizenship behavior. As for the concept of consumer participation behavior, TikTok integrates consumer cognitive information into the sharing on platforms through browsing, interactive, and creative behaviors. Short-video social media platforms offer a channel for a high level of social interaction between video providers and followers. The viewers of TikTok may turn into video providers at some point. The features of TikTok are simple for video providers as it mainly caters to short videos lasting 15 s. However, the entire shooting process is divided into three phases, namely, selecting music, shooting, and post-editing, in which unique elements can be added. Co-creation behavior not only creates economic value for the platform but also generates emotional, functional, and social values for consumers.

Theoretical contributions and implications

Theoretical contributions

Firstly, co-creation behavior contributes economic value to the platform and provides emotional, functional, and social value for consumers. Previous studies examined the impact of value co-creation, while they usually consider effect of value co-creation on the contribution to companies' economic value. However, this paper suggested the social and economic values of co-creation behavior from the consumer's perspective. As consumers are highly engaged in the short-video platforms, their cognitive messages are integrated into the platforms through their browsing, interactive, and creating behaviors. The related co-creation behavior provides an opportunity for a high level of interactivity which facilitates social interaction among strangers. As a result, consumers of short-video platforms seek social recognition by sharing their opinions or daily lives. In addition, the measurement of the effects of perceived value between consumer engagement behavior and citizenship behavior revealed that perceived value significantly mediated the relationship between consumer engagement behavior and citizenship behavior. This is a new research perspective with significant theoretical value for previous studies.

Secondly, this study examined the internal mechanism of the perceived value between engagement and citizenship behaviors. The results indicated that consumer-perceived value mediated the relationship between consumer engagement and citizenship behaviors. Thus, it contributed to consumers' intentions to continuously use a particular service and enhances the likelihood of citizenship behavior. Previous studies on value co-creation and the related effects focused on revealing the phenomena, yet they paid less attention to explaining the underlying behavioral mechanisms. This paper highlighted the social value of value co-creation and verifies\d the mediating effect of the perceived value, which provided a new perspective and research framework for studies on the impact of value co-creation.

Thirdly, this paper examined how consumers are involved in developing social practices when they engage in livestreaming shows through the theoretical view of social practices. The value co-creation mechanism was constructed and tested from the perspective of social practice theory through the reinforcement

TABLE 5 Results of hypotheses testing.

Hypothesis	Standard load	T-value	*P*	Conclusion
H1a	0.018	0.582	0.561	Rejected
H1b	0.491***	14.242	***	Supported
H1c	0.024	0.715	0.475	Rejected
H2a	0.243***	8.915	***	Supported
H2b	0.346***	12.027	***	Supported
H2c	0.243***	8.455	***	Supported
H3a	0.026	0.974	0.33	Rejected
H3b	0.397***	13.996	***	Supported
H3c	0.379***	12.967	***	Supported
H4a	0.226***	7.949	***	Supported
H4b	0.229***	7.452	***	Supported
H4c	0.284***	8.942	***	Supported

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 6 Bootstrap mediator effect test.

Path	Influence coefficient	Standard deviation	Bias corrected (95%)			Percentile (95%)		
			LLCI	ULCI	P	LLCI	ULCI	P
Browsing behavior—emotional value—citizenship behavior	0.003	0.007	−0.011	0.017	0.646	−0.011	0.018	0.637
Browsing behavior—functional value—citizenship behavior	0.062	0.011	0.043	0.087	0.000	0.042	0.085	0.000
Browsing behavior—social value—citizenship behavior	0.011	0.009	−0.006	0.028	0.213	−0.007	0.028	0.222
Interactive behavior—emotional value—citizenship behavior	0.107	0.015	0.078	0.139	0.000	0.078	0.139	0.000
Interactive behavior—functional value—citizenship behavior	0.080	0.013	0.056	0.109	0.000	0.055	0.108	0.000
Interactive behavior—social value—citizenship behavior	0.120	0.017	0.090	0.155	0.000	0.089	0.153	0.000
Creative behavior—emotional value—citizenship behavior	0.010	0.008	−0.003	0.027	0.134	−0.004	0.026	0.159
Creative behavior—functional value—citizenship behavior	0.063	0.011	0.043	0.086	0.000	0.043	0.085	0.000
Creative behavior—social value—citizenship behavior	0.119	0.017	0.088	0.155	0.000	0.087	0.154	0.000

of livestreaming practices by livestreaming platforms (Trowler and Bamber, 2005; Anggraeni et al., 2020) and the proliferation of content creators for their practices (Akaka et al., 2022). Moreover, this paper further revealed the theoretical explanatory power of social practice theory in dissecting the value co-creation process.

Management implications

The intensity and frequency of TikTok consumers' daily engagement need to be enhanced in various ways. This study found that consumers' browsing, interactive, and creating behaviors enhance consumers' perceptions of emotional, functional, and social value. Furthermore, consumers may engage in citizenship behavior to preserve the platform once their perceived value has been enhanced. Therefore, the enhancement of consumer citizenship behavior needs to be further contextualized according to their engagement behavior. Since engagement and creating behaviors can enhance three perceived values, platforms should place emphasis on developing strategies to simulate positive interactions with consumers and content creators and encourage consumers to create content based on their own experiences. The platform may encourage consumers to browse and repost short videos by setting up reward mechanisms, such as prize draws for reposting. The platform may also plot corresponding short-video contests to directly involve consumers in producing and uploading short videos to increase their perceived value and then, enhance citizenship behavior.

Research limitations and prospects

It is worthwhile for next studies to further investigate whether there are cross-cultural differences in the findings. Firstly, the research on value co-creation mechanism in live-streaming platforms is still at the early stage, the related literature is scarce. The research on short-video social media platforms as an emerging business model is in its infancy as well. The theoretical basis is relatively limited. Hence, future research in this area needs to be actively promoted. Secondly, although TikTok selected in this study is representative in the field of the short-video social media platforms, differences still exist between distinct live-streaming platforms. Therefore, further discussion of this work should be undertaken. Thirdly, this study proved that perceived value plays an important role between consumer participation and citizenship behavior. However, citizenship behavior may also have an impact on consumer participation. As this paper only conducted one-way research, future work will be done to delve into the co-creation mechanism of live-streaming platforms and the relationship between these important concepts from different perspectives. Related research will be further promoted to different industries to improve the results' universality and recognition.

Data availability statement

The raw data presented in this article are not currently available because research based on this data is ongoing. The raw data will be available from the corresponding author upon reasonable request.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

JY, JR, and MZ conceptualized the study and organized the data collection. JY and JR wrote the first draft of the manuscript. JY and MZ performed the analyses and wrote the results section. HC and HW designed the research framework and made important revisions to the full text. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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How does short video use generate political identity? Intermediate mechanisms with evidence from China's small-town youth

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Introduction: China's Small-town Youth is an important social class connecting urban and rural development. Its ideological status is closely related to social stability and development so that the study of political identity of small town youth in China has become an important topic.

Methods: Based on survey and in-depth interviews, this paper investigates the intermediate mechanism of short videos use on political identity of China's Small-town Youth.

Results and discussion: The study found that the use of short videos by China's Small-town Youth has a significant positive impact on political identity, and media trust and political trust play a complete mediating role between the use of short videos and political identity. Cultural identity as the main content of China's political ideology propaganda, cannot affect political trust. This research provides theoretical basis and practical enlightenment for the systematic understanding of the spiritual world and political beliefs of China's Small-town Youth, and for exploring how to enhance their political identity through short videos use.

KEYWORDS

youth behavior, social media use, political identity, cultural identity, political trust

1. Introduction

In recent years, discussions on topics such as "Houlang" and "small-town swot" (Swot here refers to a person who spends too much time studying) in China have become popular on the Internet. The former refers to the emerging generation of young people with great potential for development, while the latter refers to the young students who were born in small towns, studied hard from childhood, and were good at taking exams but lacked certain vision and resources. It's axiomatic that the new generation of young people has become a hot topic of concern. Among them, the young people in small towns, which connect urban and rural areas, constitute a significant link in creating an "olive-shaped social structure" in today's Chinese society. Young people in small towns are those who were born in counties and towns in or below the third and fourth tier areas, grow up in their hometown, and then move to big cities, provincial capitals, and surrounding cities (Qin, 2021). According to China's National Bureau of Statistics, the number of China's small-town youth has reached 227 million (Zhang and Chen, 2022). Driven by the Chinese government's rural revitalization strategy and development policy of urban-rural integration, the scale of China's small-town youth is still expanding and becoming a rising and prominent group in Chinese society. However, with the rapid economic development in first-tier cities and the acceleration of the new urbanization process, small-town youth face a large gap between their living situation and consumption potential, resulting in their vulnerability to the negative hostage of the technological revolution and economic capital at the spiritual level, which hinders the formation of positive ideological and political concepts. Previous studies have shown that the class identity, social justice, and social trust of China's small-town youth are generally low (Zhao and Sun, 2019).

The class inequality of small-town youth is projected in the media discourse, resulting in their social and cultural leadership being at a disadvantage as well. The group is demonized and stigmatized, and they develop more negative political attitudes. The emergence of short videos provides an opportunity to improve this dilemma. Due to the low threshold of content production and strong adaptability of scenes, short videos reduce the deficit of discourse (Peng, 2019). A large number of China's Small-town Youth gather on short video platforms to construct self-image and express emotions independently (Liu and An, 2019), and the empowerment of self-expression contributes to the promotion of their sense of identity. Although there are still various kinds of communication chaos and value risks in the short video platform, with the change of new audio-visual media technology, the impact of short video on the political identity of China's Small-town Youth has also generated more possibilities. In the meanwhile, political identity, as a psychological manifestation of political standpoint, is believed to be closely related to public trust (Hernandez and Minor, 2020). Trust in the short video platform and the political system may play a role in the interaction between the use of short videos and the construction of political identity.

Based on the above discussion, this study examines the impact of short video use on political identity of China's Small-town Youth, and the intermediate role that media trust and political trust may play in this process. Moreover, this study aims to systematically understand the spiritual world and political concepts of young people in small towns in China, better guide their political values and explore an effective way to enhance their political identity through short videos.

2. Literature review and hypotheses

2.1. The political efficacy of the media

As politics is expanding and broadening from "emancipatory politics" to "life politics," the role of the media in this transformative process turned necessary (Verstraeten, 2004). With it regarding the importance of media as source of information about politics and society, the autonomy of media institutions from other social and political institutions are usually guided by political identity in media logic or political logic (Strömbäck and Esser, 2014, p. 375–403). Media is able to play a definite role in post-truth politics, as so-called post-truth era is now involved in a by-product of populism on the mass media (Salgado, 2018).

The media also plays a role in political perspectives between different social groups. According to the research, the richness of resources owned by different social classes is related to the depth and breadth of media use, and there is also a significant gap between their media access and use ability (Murdock and Golding, 2004, p. 244–260). For example, people with lower socioeconomic status have a lower level of media use; In terms of media presentation, most of the media's attention is focused on elite members from the "high level" of society, creating and further deepening class stereotypes (Kendall, 2008). These factors will affect the life feeling and social mentality of individuals in the group, and thus affect their political identity.

Political identity is a key factor influencing political identity (Miner et al., 2021). Scholars consider the relationship between media use and political identity, and generally believe that as a media with the function of spreading ideology, it has fully realized its political function, and all kinds of media have a certain effect on shaping identity (Jennifer and Cynthia, 2020). This way of thinking includes two negative effects and positive effects: first, media use crowds out people's input in social public life and weakens political identity; Secondly, the media can improve the political cognitive ability and promote the public's political trust and sense of identity. Comparing the two differences, it can be speculated that "trust" may be the key to transforming the negative effects of media use and enabling it to promote political identity. Effective government depends on the consent of the governed and the ability of citizens to get along with each other under a certain degree of mutual understanding (Newton et al., 2018, p. 37). Therefore, the effective political function of the media may also be achieved through the two paths of citizens' acceptance of the media and their psychological support for the political system, media trust and political trust should be taken into account.

2.2. The relationship between short video use and political identity

Political identity refers to the individual's affiliation to political units, geographical regions and groups in social life, as well as the subjective cognition of certain political theories, views and propositions (Rosenbaum, 1984). It also shows the process of internalizing these into psychological character and emotional will, and externalizing them into political literacy and political behavior (Gentry, 2018). It includes three dimensions, as political interest identity, political system identity and political value identity (Kong, 2007). It is the basis of political identity for individuals to obtain benefits from the political community, so that they can obey and recognize the system of political parties and governments. Then their emotions will be satisfied and transformed into belief and affirmation of mainstream ideology and values.

Media technology is a critical factor affecting people's political cognition and attitude. In recent years, the Internet has provided more selective space for the public to contact and interact with political information. Hence, the impact of media use in the Internet era on public political consciousness is complicated. Some studies have shown that ICTs have ensured the construction and maintenance of people's daily political identity (Garrett et al., 2012). Social media has created a mass base, technical support and practical mode for the construction of political identity, but at the same time, there may exist risks such as blocking the construction of mainstream ideology due to multiple identities (Lu et al., 2016).

Since the public opinion field on short video gradually emerged in 2016, Chinese government at all levels and mainstream media have settled in the short video platform. Now, short video platform has been put an important position for the dissemination of mainstream values. Previous studies have shown that government affairs of multiple central level units have formed an effective transmission of positive emotions, which is conducive to people's sense of identity with the country and government (Zhang and Yin, 2019). Short videos drive users' re-transmission behavior through emotional communication, which is conducive to improving the public's political identity (Zhao and Li, 2022). Furthermore, short videos record and perpetuate rural culture, reflect on public issues such as the plight of the countryside, and greatly influence the ideology and value identity of small town youth. Therefore, this study puts forward the following research hypothesis:

> H1: The use of short video has a positive effect on the political identity of China's Small-town Youth.

2.3. The intermediate effect of media trust

As an important factor affecting people's political ideas and attitudes, trust has always attracted academic attention. Media trust refers to the reliability of media perceived by the public (Burgoon and Hale, 2010). The research shows that, media trust originates from the attributes of the media itself and the public's contact with media, and it increases along with the media use frequency (Johnson and Kaye, 2009). Wang (2017) found that there is a strong positive correlation between media trust and political psychology. Lu and Duan (2015) further pointed out that media trust, as an intermediate variable, affects the influence of the Internet on young people's political attitudes. It is apparently that the communication effect of the content of short video platform is affected by the trust of public media. The higher the trust, the easier it is to accept and recognize the information and values transmitted by short video. Therefore, the following hypothesis is proposed:

> H2: The media trust of China's Small-town Youth plays an intermediate role in the influence of short video use on political identity.

2.4. The intermediate effect of political trust

Political trust refers to citizens' belief or confidence in the government or political system operation to produce results consistent with their expectations (Miller, 1974), which directly affects people's political attitudes. Different types of media use have different effects on people's political trust. The use of political news by traditional media has positive and significant effects on political trust, while the use of online political news has significant negative effects (Chadwick, 2013). At present, various government departments in China release government information through the platform of short video, trying to enhance public political trust and optimize the effect of political communication (Zhou and Lu, 2019). It has been confirmed that political trust has a significant positive effect on college students' political party identification (Saarinen et al., 2019), promoting the process of political identity in real political life (Patrizia, 2004). The government or relevant institutions can enhance political identity by building political trust in cyberspace (Zmerli, 2014). Based on this, this study puts forward the following research hypothesis:

> H3: The political trust of China's Small-town Youth plays an intermediate role in the influence of short video use on political identity.

3. Research methods

3.1. Sample

According to the definition of All-China Youth Federation, youth mainly refers to adult citizens under the age of 40 years old, so the age selection criteria is 18–40 years old. In terms of the sampling method, this study adopts both offline and online ways with non-probability judgmental sampling method and snowball method to collect data from China's Small-town Youth aged 18–40 who were born in counties and towns at the third and fourth tier or below. Finally, 525 questionnaires are effectively collected.

(1) On sample size, Schiffman and Kanuk (1991) and Yan et al. (2018) clarify the basic rules of sample size determination for the sampling method: (1) A sample size larger than 30 but smaller than 500 is suitable for most studies; (2) when there are more variables, a sample size of 10 times or more than 10 times the number of variables is optimal. According to this rule, there are 34 questions measuring core concepts in this study, and a sample size of 400 or more would be appropriate. In this paper, over 400 valid questionnaires were returned, which meets the sample size requirement. **(2)** On sampling technique, this study adopts both offline and online methods with the non-probability judgmental sampling method and the snowball method to collect data from China's small-town youth. According to the administrative division of the Chinese government, there are four levels of urban hierarchy: provincial cities, provincial capitals, prefecture-level cities, and county-level cities. In this paper, "small-town youth" is defined as being from county-level cities and below. Considering the vast size of China and the varying levels of economic development in many county-level cities and below, this paper uses a non-probability judgmental sampling method to conduct the questionnaire survey, enhancing the representativeness of the sample. So we select the samples from a number of county-level cities and below in eastern, central, and western China, which is a strong representation of the group.

Through the descriptive statistical analysis of the samples by the data statistical analysis software SPSS25.0, the sample distribution is as follows: the education level of the survey participants is concentrated in junior college and undergraduate (82.5%); Communist Youth League members accounted for the majority (75.4%); male accounted for 49.1%, female accounted for 50.9%; 76.1 percent of them have lived or studied in big cities, and 29.1 percent of them are young people from small towns who have returned home from cities. The sample distribution is basically consistent with the public report on China's Small-town Youth (Southern Weekend and PPDAI, 2018), which is in line with the characteristics of China's Small-town Youth, so the sample can be considered reasonable.

In order to test the reliability and validity of the questionnaire and answer the above research questions, the reliability analysis, KMO test and Bartlett spherical test of the data were firstly carried out in this study, and the common method deviation test was also carried out. Secondly, the correlation analysis of each variable is carried out. In addition, the control variables and independent variables were put into the linear regression model successively, and the influence of independent variables on dependent variables was obtained. Finally, multiple linear regression was used to test the mediating effect on the basis of the control variables.

3.2. Measures

Dependent variable: political identity. This study investigates the current situation of political identity of China's Small-town Youth from three dimensions: political interest identity, political system identity and political value identity. Among them, political interest identification investigates the satisfaction of China's Small-town Youth on economic income and hometown construction and development. Political system identification investigates the understanding and support of China's Small-town Youth to the leaders and staff of political organizations. Political value identification investigates the understanding and support of China's Small-town Youth on the significance and value of the implementation of national policies, socialist core values, patriotism and other core values. A five-level Likert scale is used for measurement (The values are assigned sequentially from 1 to 5, with 1 indicating completely disagree and 5 indicating completely agree).

Independent variable: short video usage. It is mainly measured by asking respondents "the use of short videos in the past year," including the overall frequency of short video browsing, liking, commenting, forwarding and collecting. A four-level Likert scale is used to assign values according to "almost every day," "often," "occasionally" and "hardly at all."

Intermediary variables: (1) media trust. Based on the subjective evaluation of respondents on the credibility of media content, this study investigates the trust degree of China's Small-town Youth in short videos. By asking "how credible do you think the information on the short video platform is," a five-level Likert scale is used to measure the information (1 = downright distrust, 5 = absolutely trust). (2) Political trust. It mainly investigates the overall level of trust of China's Small-town Youth in government agencies and public officials, including 11 options such as courts, procuratorates, public security organs, the Party Central Committee and the central government, provincial government, municipal government, county government, township government, neighborhood committee, village committee, and social organizations including trade unions, disabled persons' federations, literary and cultural federations, women's federations, etc. Measure with Likert five level scale (1 = downright distrust, 5 = absolutely trust).

Control variables: in addition to short video usage, media trust and political trust, some demographic variables also affect the political identity of China's Small-town Youth. Referring to previous studies, the gender, age, education level, political outlook, occupation type, birthplace, and current living status of the respondents are included in the statistical analysis model as control variables.

4. Results

4.1. Reliability and validity test

SPSS25.0 was used to process and analyze the data, and the reliability and validity of the variables were tested: Cronbach's Alpha value of all variables were greater than 0.7, and KMO measure value was 0.864 ($p < 0.05$). The reliability and validity were favorable and acceptable, so data quality was reliable. Further, principal component analysis was conducted on the questionnaire items, and the analysis results were as follows.

4.2. Reliability and validity test

Common method bias refers to the artificial covariation between predictive and outcome variables due to the same data source or rater, the same measurement environment, the project context, and the characteristics of the project itself. Controlling such systematic bias can effectively reduce the potential misleading of the conclusion. In the first step, eight factors with eigenvalues greater than 1 were identified using Harman single factor test. The variance explanation percentage of the first common factor was 29.62%. In general, when the variance explanation percentage of the first common factor was less than 40%, it could be considered that there was no serious common method bias. Secondly, partial correlation analysis is used to further test. The first common factor without rotation was isolated through exploratory factor analysis, and then the partial correlation between independent variable and dependent variable was investigated after controlling the common factor. If the original correlation coefficients are still significant after the analysis according to the above steps, the influence of the common method bias can be ignored. After controlling for the first common factor precipitated in this study, the correlation between short video use and political identity was still significant, indicating that there was no serious common methodology bias in this study.

4.3. Correlation analysis of short video use, media trust, political trust, and political identity

The results show that the average score of using frequency of short videos among China's Small-town Youth is 2.96, and the standard deviation is 1.043, indicating that the respondents' overall use of short videos is close to regular use. The average score of political identity of China's Small-town Youth is 3.58, and the standard deviation is 0.543, indicating that the majority of respondents have a positive political attitude. Among them, political system identification (M = 3.74) is higher than political interest identification (M = 3.44) and political value identification (M = 3.56). The average score of media trust is 3.05 and the standard deviation is 0.708. The average score of political trust is 3.89, and the standard deviation is 0.702.

There is a significant correlation between the use of short videos of China's Small-town Youth and three variables: political identity ($r = 0.121$, $p = 0.006 < 0.01$), media trust ($r = 0.301$, $p = 0.000 < 0.01$), and political trust ($r = 0.122$, $p = 0.005 < 0.01$). There is a significant correlation between media trust and political identity (r = 0.256, p = 0.000 < 0.01), and political trust (r = 0.165, p = 0.000 < 0.01). There is a significant correlation between political trust and political identity (r = 0.542, p = 0.000 < 0.01). All variables have correlation, which is suitable for further regression analysis and intermediary effect test.

4.4. Multiple regression analysis of short video use on political identity of China's small-town youth

In order to further reveal how China's Small-town Youth's short video use affects their political identity, this study takes demographic variables as control variable, short video use frequency as predictor variable, and the dependent variables are political interest identity, political system identity, and political value identity, respectively. Forced entry method is used to conduct multiple regression analysis on the above variables, to investigate the effects of short video use on different levels of the three dimensions of political identity.

The regression results showed that the frequency of short video use had a weak promoting effect on political interest identification, and the regression coefficient β value was 0.077, but the regression results were not significant (p > 0.05). However, there were significant positive effects on political system identity and political value identity (p < 0.05). The regression coefficient β value of short video use and political system identity was 0.119, and that of political value identity was 0.094. The result shows that the use of short videos to improve the political identity of China's Small-town Youth mainly depends on the political system and value identity dimensions. On the basis of the control variable module, the main effect module increases the variation of the three dependent variables by 0.006, 0.014 and 0.009, respectively.

In the part of control variables, the gender, living status and occupation type of China's Small-town Youth have significant influence on their political identity, especially the influence of occupation type cannot be ignored. The three dimensions of political identity of Party and state organs and public institution workers are generally higher than those of other occupations. Compared with the three dimensions of political identity that are affected by occupation type, the gender and residence status of China's Small-town Youth only affect political value identity and political interest identity, respectively. The political value identification of male China's Small-town Youth is higher than that of female. China's Small-town Youth who stay in big cities to work and now live in the first and second tier cities generally have higher political interests than those who return from big cities. In addition, the political status and education level of China's Small-town Youth have no significant influence on their political identity.

4.5. The intermediary effect test of media trust and political trust

According to the above analysis, there is a significant correlation between the variables, which meets the premise of the mediating effect test. According to the traditional mediating effect test method, under the control of demographic variables, this study uses multiple regression to test the mediating effect of media trust and political trust on the relationship between short video use and political identity of China's Small-town Youth in five steps, and the test model is shown in **Figure 1** and **Table 1**.

It is found that the use of short videos by China's Small-town Youth can positively predicts political identity (β = 0.111, p < 0.01), and H1 is supported. Meanwhile, the test data shows that the use of short videos is positively correlated with media trust and political trust, and the higher the frequency of short videos, the stronger the media trust and political trust of China's Small-town Youth. Both media trust and political trust are positively correlated with political identity. When the mediating variable media trust was included in the model, the effect of short video use on political identity was significantly weakened, the regression coefficient decreased from 0.111 to 0.052, and the direct path changed from significant to insignificant. When the mediating variable political trust was included in the model, the regression coefficient decreased to 0.049, and the direct path also changed from significant to insignificant (**Table 2**). This indicates that short video use indirectly affects the political identity of China's Small-town Youth through media trust and political trust, respectively. Both media trust and political trust play a complete mediating role between short video use and political identity, and H2 and H3 hold (shown in **Tables 3**, **4**).

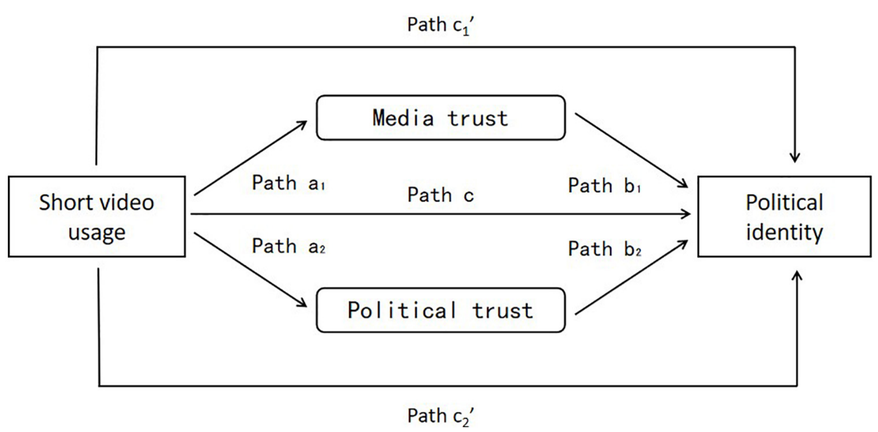

FIGURE 1
Model of intermediary effect test.

TABLE 1 Variable measures.

Variables	Items	Factor loadings	Cronbach's Alpha	Scale source
Short video use	A1. Frequency of viewing short videos	0.55	0.76	Ma and Wang, 2015; Yang and Sun, 2019
	A2. Frequency of liking short videos	0.78		
	A3. Frequency of commenting on short videos	0.79		
	A4. Frequency of retweeting short videos	0.74		
	A5. Frequency of collecting short videos	0.76		
Media trust	B1. I trust the information on short video platforms			Ma and Wang, 2015
Politics trust	C1. I trust the court and its public officials	0.86	0.92	Mei and Tao, 2018; Wang and Jin, 2019
	C2. I trust the public Prosecutor's office and its public officials	0.83		
	C3. I trust the public security authorities and their public officials	0.42		
	C4. I trust the party and central governments and their public officials	0.74		
	C5. I trust the provincial government and its public officials	0.86		
	C6. I trust the municipal government and its public officials	0.90		
	C7. I trust county governments and their public officials	0.90		
	C8. I trust the township government and its public officials	0.90		
	C9. I trust the resident council and its public officials	0.82		
	C10. I trust the Village Council and its public officials	0.79		
	C11. I trust organizations such as trade unions, disabled persons' associations, cultural associations, women's associations and their public officials	0.83		
Political identity	D1. The development of the country is closely related to me	0.69	0.85	Kong, 2007; Fang et al., 2013
	D2. When personal interests and national interests conflict, personal interests must be unconditionally subordinated to national interests	0.68		
	D3. I agree with the Chinese political system, which has promoted China's development	0.88		
	D4. I support China's political system, which reflects the superiority of China's socialist system	0.86		
	D5. I think the Chinese political system has legitimacy and authority	0.88		
	D6. I agree with the socialist core values emphasized by the Party and government	0.60		
	D7. I don't think there are so-called "universal values" such as freedom, democracy and human rights in the world	0.64		
	D8. I think China must adhere to Marxism-Leninism and Mao Zedong Thought as its guide and follow the road to socialism	0.67		
	D9. I support that teachers should never be allowed to make statements critical of the party and government in the classroom	0.61		
	D10. I believe that groups and troublemakers who challenge the authority of the government and the existing social order must be severely punished	0.75		
	D11. I think I am capable of participating in political or public affairs	0.37		
	D12. I think government leaders are like the parents of an extended family, and anyone should obey them	0.64		
	D13. I believe that China's diplomatic problems such as territorial and trade disputes are mainly caused by other countries provoking them in the first place	0.59		
	D14. I believe that Taiwan should be reunified by force if conditions permit	0.43		
	D15. I think if you are patriotic, you must boycott Japanese and American goods	0.76		
	D16. I believe that foreign hostile forces are determined to kill us and that they are behind many of China's problems	0.63		
	D17. I think I must be a powerful leader when I have the opportunity to make others obey me	0.79		

TABLE 2 Correlation of core variables.

		Short video usage	Media trust	Political trust	Political identity
Short video usage	Pearson correlation	1	0.301**	0.122**	0.121**
	Sig.		0.000	0.005	0.006
Media trust	Pearson correlation	0.301**	1	0.165**	0.256**
	Sig.	0.000		0.000	0.000
Political trust	Pearson correlation	0.122**	0.165**	1	0.542**
	Sig.	0.005	0.000		0.000
Political identity	Pearson correlation	0.121**	0.256**	0.542**	1
	Sig.	0.006	0.000	0.000	

**Indicates significance at the 0.01 level.

TABLE 3 Multiple regression analysis of short video use on political identity of China's small-town youth (standard regression coefficient).

Predictive factor	Political interest identity				Political system identity				Political value identity			
	M1		M2		M4		M5		M7		M8	
	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*
Dwelling state	−0.105**	0.015	−0.109*	0.012	−0.015	0.731	−0.020	0.640	−0.049	0.247	−0.053	0.207
Gender	−0.085	0.053	−0.084	0.056	−0.063	0.160	−0.060	0.173	−0.142**	0.001	−0.140**	0.001
Level of education	−0.059	0.222	−0.060	0.216	−0.019	0.696	−0.020	0.679	−0.041	0.393	−0.042	0.382
Politics status	−0.072	0.129	−0.068	0.154	−0.078	0.106	−0.071	0.138	−0.054	0.248	−0.049	0.296
Vocational type	−0.164***	0.000	−0.160***	0.000	−0.129	0.005	−0.122**	0.008	−0.210***	0.000	−0.204***	0.000
R^2	0.058				0.026				0.082			
Short video usage			0.077	0.071			0.119**	0.006			0.094*	0.025
$\triangle R^2$			0.006				0.014				0.009	
R^2			0.064				0.040				0.091	
Adjusted R^2			0.053				0.029				0.081	
F	6.425***		5.922***		2.728*		3.573**		9.303***		8.652***	

***, **, *Indicate significance at 0.001, 0.01, and 0.05 levels, respectively.

TABLE 4 The intermediary effect test of media trust and political trust.

Inspection steps	Dependent variable	Independent variable	SE	β	t	*p*
1 (Path c)	Political identity	Short video usage	0.034	0.111	2.617**	0.009
2 (Path a_1)	Media trust	Short video usage	0.044	0.290	7.090***	0.000
3 (Path b_1) (Path c_1')	Political identity	Media trust	0.034	0.203	4.569***	0.000
		Short video usage	0.035	0.052	1.188	0.236
4 (Path a_2)	Political trust	Short video usage	0.046	0.116	2.655**	0.008
5 (Path b_2) (Path c_2')	Political identity	Political trust	0.027	0.533	15.021***	0.000
		Short video usage	0.029	0.049	1.372	0.171

***, ** and *Indicate significance at 0.001, 0.01, and 0.05 levels, respectively.

5. Conclusion and discussion

5.1. Conclusion

Based on the data results, this study presents the following four key findings:

First, the use of short videos is helpful to improve the political system identity and political value identity of China's Small-town Youth. The use of short videos has a vitally positive impact on the political identity of China's small-town youth, among which the positive impact on political system identity and political value identity is significant and the impact on political interest trust is weak. Among the three dimensions of political identity, interest identity is the starting point and foundation of political systems and value identity. However, the low impact of short videos on political interest trust has a realistic rationale. At present, there are differences in political identity among China's small-town youth. Some young people's hopes for future development and quality of life coexist with uncertainties, and they face survival difficulties in work and life, leading to a lack of identity. Although it is difficult to satisfy the material needs of reality only through the spiritual world of short videos, various images can be displayed on the short video platform to express emotions, express the yearning for a better life, or make informational compensation through the positive topics pushed by short videos (Li et al., 2022). This further indicates that short video ideological guidance should focus on the promotion of the superiority of the political system and the transmission of mainstream values, and the identification of political values is also helpful to promote the identification of the country, political party, policy system, and the observance of social and political order.

Second, China's Small-town Youth promote political identity shaping mainly through the political use of short videos. The use of short videos significantly promotes the political identity of China's small-town youth. However, not all content on short video platforms can effectively improve the political identity of China's small-town youth. At present, government departments at all levels and mainstream media have entered the short video platform to seize the public opinion field of short video (Peng et al., 2019). Short video is not only a place for recreation and entertainment, but it is also a diverse and unintentional field of public opinion (Cui and Tong, 2022), which has become the field of many public events reporting and open discussion. From government micro-blogs to WeChat to short videos, short videos of government affairs are the product of the government's active adaptation to the information supply and demand in the Internet era. Mobile short video has become an important field of public opinion in the new era (Cui and Tong, 2022; Peng et al., 2022). This research shows that the small town youth group is not numbly addicted to the pan-entertainment information flow but actively uses the short video platform, makes full use of its public communication function, and actively engages in political information contact. Hard news short video has sufficient market demand.

Third, media trust and political trust play an intermediate role in the influence of short video use of China's Small-town Youth on political identity.

Third, media trust and political trust directly affect the formation of political identity among China's small-town youth. The higher the media trust and political trust of small town youth, the higher their political interest trust, political system identity, and political value identity will be, and the better their political identity will be. This is consistent with previous research findings that media trust influences people's views on socio-political democracy (Ognyanova and Ball-Rokeach, 2015). The higher the trust in the media, the more likely people are to believe the information the media conveys and the more confident they are about the country and government decisions. In particular, the media trust and political trust of short government affairs videos will significantly affect the communication effect of short government affairs videos and improve psychological cognitive recognition and trust of official media and political systems (Peng et al., 2022).

In the influence of short video use on political identity, media trust and political trust play an important mediating role. The higher the frequency of short videos, the higher the media trust and political trust of China's small-town youth, and the more obvious the positive impact on political identity. Media trust affects the audience's acceptance of short video content, while political trust directly affects the public's political attitude. According to the theory of political socialization, both of them are influenced by the use of short videos, and together with the latter, they constitute an interactive system that affects political identity. The lower the political information contact cost, the more effectively people participate in public affairs discussion and political participation through short video, and the more inclined they are to change from passive political identity to active political identity (Hou et al., 2021). Therefore, in order to enhance the positive impact of short video use on the political identity of China's small-town youth, it is necessary to continuously improve and enhance the media trust of small-town youth in short video platforms and their political trust in the country and government.

Fourth, dwelling state, gender and occupation affect the political identity of China's Small-town Youth not the cultural identity. The occupation type of China's small-town youth has influence on the three dimensions of political identity. Some small town youth have unclear career planning, worry about the surrounding environment and their own situation, and have low social security. Compared with stable occupations such as civil servant, small-town youth engaged in other occupations have serious anxiety about unemployment, which leads to a decrease in their subjective wellbeing and satisfaction with the country, society, and political party. Moreover, with the increase in occupational instability and the decrease in compensation, their political identity also decreases. This has to do with the basic national conditions in China, where people have a higher sense of gain within the system. The gender and dwelling state of China's small-town youth, respectively, affect their political value identity and political interest trust. Male Chinese small-town youth have a stronger political identity than females. The political interest trust of "ranger type" (China's small-town youth who stay in big cities and struggle and now live in first and second-tier cities) is generally higher than that of "reflux type" (China's small-town youth who return home from big cities).

5.2. Discussion on ideology, identity, and gender

On the whole, the research results refute the pessimistic view of the ideological threat of short videos; that is, the inference that the thoughts of China's small-town youth will deviate from the right track due to exposure to inferior content has not been confirmed, and the overall use of short videos by China's small-town youth promotes the shaping and promotion of political identity (Chen, 2021). Although short videos appear to be the result of pan-entertainment in a fast-paced era (Xiao et al., 2019), they abandon complex narrative modes and editing techniques and deepen the public's understanding and cognition of political systems and values through emotional communication (Cao, 2021; Cui and Tong, 2022). Short video has a strong impact on vision and hearing and has more rendering power than other media. Short video has distinct advantages as a tool for guiding ideas, particularly for guiding the values of society's middle and lower classes.

At present, it is common for China's small-town youth to "retire to the countryside" (Guo, 2020), which is highly consistent with the overall vision of China's rural revitalization strategy. However, in the process of participating in the construction of the countryside, complicated "role expectations," "shallow" social integration and a fragile social support system can easily lead to deviations in the ideals of small town youth. The overall quality of life and material conditions of big cities are better than those of small town;, the social security system is more perfect;, and the young people in small towns will be more willing to identify with the ruling party (Liu, 2012). At the individual level, people's identification of political interests is more determined by their own experience and observation of the surrounding environment. Because of gender discrimination in society, female youth in small towns have little political identity. Walzer (1990) believed that political identity and cultural identity are not necessarily mutually exclusive, and cultural identity can help people with a sense of ethnic identity find their spiritual destination. Cultural identity should be prevented from evolving into narrow tribalism. Political identity is the basic condition for the existence of any country, but there is no need to threaten the survival of disadvantaged cultural groups with positive assimilation policies (Walzer et al., 1982). Therefore, cultural identity and political identity should coexist, and they should interact and grow. Although the Chinese government has been emphasizing and educating young people to identify with Chinese culture, it can be seen from in-depth interviews that cultural identity cannot effectively promote the political trust of small town youth, but plays an obvious role in national identity.

5.3. Theoretical contribution and practical implication

In recent years, studies of different orientations have drawn different conclusions on the direction of the effect of Internet media on political identity (Cao, 2021; Chen, 2021; Cui and Tong, 2022). Although the positive effect of the use of traditional media or official media on political attitudes is widely recognized, there are still discussions on the negative, ineffective, and positive positions of the media influence of the Internet or social media. At the theoretical level, this study reveals the inner psychological mechanism of the formation of political identity in China's small-town youth and explores how the use of short videos affects their political identity. Its theoretical contribution is to find the promotion effect of short video use on the political identity of China's small-town youth and clarify the mechanism of short video use on political identity from the perspective of media trust and political trust. On this basis, this study puts forward the following thoughts on how to improve the political identity of small-town youth through the short video platform:

First and foremost, consideration should be given to the far-reaching importance of a short video platform in shaping the political identity of small-town youth. For one thing, we should standardize the media production content of short video platforms, strictly formulate and implement the user management treaty of each platform, call on short video platforms to jointly advocate positive value orientation, and build a legal and compliant short video public opinion field in the new era. For another, the platform algorithm mechanism should be used rationally to encourage the push support of high-quality short video content while avoiding the dissemination of undesirable content that can exacerbate social conflicts and instill negative values (Xiao et al., 2019; Li et al., 2022).

Secondly, the short video platform for government affairs should pay attention to the political participation significance of short video interaction and improve its political communication efficiency (Hou et al., 2021). The government and mainstream media should pay attention to the positive impact of short videos on small-town youth political identity. On the one hand, based on the perspective of government services, through emotional commitment and interaction, we should improve the stickiness of short videos of small town youth for political purposes. On the other hand, we should optimize the content of political information, emphasize the professionalism, authority, and appeal of the content, and form a benign public discussion atmosphere in the field of public opinion about short videos.

Thirdly, high media trust and political trust are the basis for the cultivation and promotion of political identity (Hou et al., 2021), which should be transformed from management logic to governance logic and strengthen the coordination and interaction among the government, platform, and audience. The supervision department of the short video platform should strengthen the examination of the authenticity and orientation of the content to enhance trust in the short video platform. Government departments should establish a good image in the administrative process, using the short video platform of government affairs to strengthen government agenda setting and win the trust and recognition of small town youth.

Ultimately, we should pay attention to the value guidance of the small-town youth who feel at a loss in China's urban-rural dualization. Relevant support measures for small town youth groups are implemented to enhance their political identity (Chen, 2021). At the same time, the short video platform is used to guide small town youth to correct their cognition of objective reality, actively adjust and escape negative mentality, and enhance their sense of responsibility and mission to promote rural revitalization and urban-rural integration development.

5.4. Limitations and future research

There are still limitations in this study. First, this study mainly investigates the impact of short video usage frequency on the political psychology of China's Small-town Youth. The relationship between short video use appeal, content preference, participation and political psychology is worth further exploring. Second, in the Polymedia Environment, the media contact channels of China's Small-town Youth are diversified, and the impact of different types of media use on their political psychology and their interaction effects need to be further studied. Third, this study only focuses on China's Small-town Youth. In the future, a comparative study on the impact of media use of Small-town Youth on their political attitudes in different countries can be carried out.

Data availability statement

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Author contributions

JQ and QD contributed to the research design and implementation. QD and XS collected the data. YD and BZ analyzed the results. All authors contributed to the writing of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Does cultural resource endowment backfire? Evidence from China's cultural resource curse

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Resource curse theory suggests that regions rich in natural resource endowments accumulate adverse economic competitive, but few studies have focused on causes and mechanisms of cultural resource curses. Since the development of the cultural industries is relatively backward in some regions with rich cultural resources in central and western China. Combined with the theory of cultural resources and the resource curse, we build cultural resource endowment and cultural resource curse coefficients and measure the distribution of cultural resource curses based on the dataset of 29 provinces in China covering 2000–2019. The results show that there is a serious cultural resource curse in western China. The causes of the cultural resource curse are multiple, place attachment and cultural field can influence cultural behaviors, and the environmental impact of industrial ecosystems causes path dependence in cultural resource exploration and cultural industry development. We further empirically tested the influence of cultural resources on cultural industries in different sub-regions of China and the transmission mechanism of the curse of cultural resources in western China. The results show that the influence of cultural resources on the cultural industries is not significant in the overall of China, but it is significantly negative in western China. The resource-dependent model of cultural industries development in western China has attracted more primary labor and crowded out government spending on education. Moreover, it hinders the upgrading of human resources and inhibits the modern innovative development of the cultural industries. This is an important reason for the curse of cultural resources in the development of cultural industries in western China.

KEYWORDS

resource curse theory, cultural resource endowment, cultural resource curse, cultural industries, transmission mechanism

1. Introduction

In the field of cultural industries, cultural resources can be applied to economic transactions, such as cultural destination development (Bourdieu, 1983). A long time in human civilization constitutes, many traditional material cultural resources and intangible cultural resources that have existed for an important endowment of human civilization for the development of cultural industries (King, 2011; Li and Katsumata, 2020). However, empirical facts show that the development of cultural industries in areas enriched with cultural resources lags far behind that in areas where cultural resources are poor. For example, western China, which has been on the Silk Road (SR) since ancient times, has a long historical and cultural tradition and rich cultural resources, but its cultural industry development lags behind some areas in eastern China. On the other hand, Shenzhen in eastern China, once likened to a cultural desert, was a small fishing village 40 years ago, and now the cultural industries are developing strongly. Scholars have established an important driving force for the modernization of cultural industries elements such as social capital (Chuluunbaatar et al., 2014), artificial intelligence and big data (Qin and Lin, 2021), digital serialization (McMullen et al., 2021), creative workers (Shaughnessy et al., 2022). Due to the heterogeneity of the composition of cultural resources, the transformation of the development mode of modern cultural industries is based on contemporary factors. We consider whether the traditional endowments of these historical and cultural resources have become a burden on the development of the cultural industries, and how they further affect the resource allocation behavior in the development of the cultural industries. In response to this problem, the current study has drawn on the resource curse theory to examine the cultural resource curse in the development of cultural industries.

Taking into account the differences in economic development levels and resource endowments in different regions, the resource curse theory explains the poor growth experience of resource-rich countries through natural resources to drive development (Sachs and Warner, 2001; Auty, 2007; Wen and Jia, 2022), extant studies have attempted to elucidate the causes and mechanisms of this curse such as the decline in the primary commodity terms of trade (Ross, 1999), differences in the quality of institutions (Mehlum et al., 2006), political corruption and the quality of politicians (Brollo et al., 2013), property rights (Wenar, 2012), links between natural resource rents and financial development (Li Z. et al., 2021). However, previous research on the resource curse mainly focuses on natural resources and economic growth, while the research on the cultural resource curse has received less scholarly attention. In this study. we aim to explore the causes of the transmission mechanism, and the curse of cultural resources. To test our hypotheses, we collected data from 29 provinces in China covering 2000–2019.

Drawing on the theory of the resource curse, this study aims to empirically explain the deviation between cultural industries and cultural resource endowment, and specifically examines the cultural resource curse in the emerging economy (such as China). More specifically, we first developed the cultural resource endowment index, which defined the scope of cultural resource endowment, including public cultural resources, cultural heritage resources, tourism resources, local language resources, and famous villages and towns resources. Second, based on the regional cultural resource endowment and the comparative advantage of cultural industries development, the cultural resource curse coefficient is calculated to explore the regional distribution of China's cultural resource curse. Third, the causes and the transmission mechanisms of the cultural resource curse were explained by comparing the influence effects of cultural resources on the development of the cultural industries by regions in terms of four dimensions of influencing factors namely cultural resources, cultural industries input factors, cultural institutions, and economic development environment. In addition, we discuss the crowding-out effect of cultural resource endowment on government fiscal expenditure from educational resources, innovation resources, and public cultural resources.

This study found that the curse of cultural resources exists in most of western China and a few central regions. The impact of cultural resources on the cultural industries is not significant nationwide, but significantly negative in the western region. From the sight of cross-cultural psychology, environmental concern has a weaker association with pro-environmental behavior in some societies (Tam and Chan, 2017), and place attachment makes the development path of cultural industries with certain cultural resource endowment dependence (Zou et al., 2022), cultural and economic disparities between regions appear to be on the rise, with the increasing demand for advantages of modern cultural industries by the decline of more peripheral regions (van der Star and Hochstenbach, 2022). The resource-dependent development model of the cultural industries in the western region attracts more primary labor and squeezes government education spending. It hinders the upgrading of human resources, inhibiting the development of modern innovation in the cultural industries, which is an important reason for the curse of cultural resources in the development of the cultural industries in western China. The research on the curse of cultural resources enriches the theoretical mechanism of cultural industry development. Our research results show that the resource-dependent cultural industries development mode has a crowding-out effect on the upgrading of human resources, which is not conducive to the development of modern cultural industries.

The rest of this study is organized as follows. Section "2. Theoretical background" expounds on the theoretical background, and Section "3. Distribution of the cultural resource curse" introduces the actual situation of the curse distribution of cultural resources in various regions of China. Section "4. Methodology" empirically examines the causes and transmission mechanisms of the cultural resource curse, and finally, Section "5. Conclusion and discussion" provides discusses conclusion and implications.

2. Theoretical background

The resource curse theory originated from international trade and later has been widely used in the field of natural resources and energy industries. In recent years, research has developed the curse of financial resources, the curse of political resources, and the curse of tourism resources, breaking the boundaries that the curse of resources originally only applies to natural resources. The relationship between cultural resources and cultural industries has been widely studied by scholars, but there are still some disagreements. For example, existing study reports that rich cultural resources can promote the development of cultural industries (Li and Katsumata, 2020), but some scholars have pointed out that areas rich in cultural resources have not benefit cultural industries with comparative advantages. The lack of consensus hinders the general relationship between cultural resources and the development of cultural industries in the context of regional differences, thereby making it difficult to conclude whether there is a cultural resource curse exists in the cultural industries.

2.1. Concept of resource curse

Research on the resource curse began before the 1980s when Singer attempted to explain poverty in resource-exporting countries in terms of deteriorating international terms of trade. Singer (1975) suggests that excessive regional exports of primary commodities have exacerbated the deterioration of supply and demand in the international market. It was not until the 1980s that new growth theories challenged Solow's convergence process and catch-up hypothesis, and their empirical studies focused on differences in growth rates across countries, finding that regions with abundant natural resources grew more slowly than regions with scarce natural resources (Leite and Weidmann, 1999; Gylfason, 2001). Auty (1994) reports that the economic growth of mineral-rich countries is constrained by mineral resources and who introduces the concept of the resource curse. Later, Stijns (2005) conducts an empirical test on the issue of natural resource abundance and economic growth, proving that natural resource abundance is negatively correlated with economic growth. The resource curse hypothesis exists in some countries that are rich in natural resources.

In addition, research has revealed the causes of the resource curse. For example, Ross (1999) reviews the four most prominent economic explanations for the resource curse, such as declining terms of trade in primary commodities, instability in international commodity markets, and poor economic linkages between resource and non-resource sectors. A disease often referred to as the Dutch disease, evidence of the resource curse comes from the new international economic order, East Asia succeeding with rapid growth in manufacturing exports, and Africa collapsing with declining primary commodities. Likewise, Mehlum et al. (2006) raised concerns over differences in growth performance among asset, resource-rich countries mainly due to how resource rents are allocated through institutional arrangements, they further argued that under producer-friendly institutions, abundant resources attract entrepreneurs into production, which means high growth, benefiting from the specialization of unproductive influence activities under predator-friendly institutions. It can be seen that the causes of the resource curse are closely related to economic development patterns in different periods and institutional differences in different regions.

Much research in the literature of resource curse has emerged not only in natural resources but also in other non-natural resource fields, such as politics and finance. Empirical evidence from Brazil suggests that greater diversion of political resources increases observed corruption and reduces the average education level of mayoral candidates (Brollo et al., 2013). Assessing the impact of the resource curse on bank efficiency from 12 oil-producing countries, the results confirm the existence of the resource curse, and countries that are overly dependent on natural resources tend to have lower financial development (Umar et al., 2021). Few studies have focused on cultural aspects, especially the "cultural resource curse." The closest study considers the tourism resource curse, where cultural tourism resources are seen as part of cultural resources (Luqman et al., 2022; Wu and Lin, 2022). For example, the study by Khalik et al. (2019) shows that there is a large temporal and spatial variation in the curse of tourism resources in China, and the spatial distribution pattern of the curse of tourism resources is high in the west and low in the east, caused by the spatial heterogeneity of talent scale, transportation accessibility, urbanization, service level, and economic development level.

2.2. The concept of cultural resource

The cultural resource is a complex system, and the interpretation of cultural resources usually comes from three perspectives. From the perspective of cultural anthropology, cultural resources are the fruits of civilization or spiritual elements created by human development activities, and methods from applied cognitive anthropology are useful for uncovering cultural consensus and more marginalized perspectives (Brown et al., 2022). From the perspective of cultural labor production, cultural resources are various types of material or spiritual resources that people use to engage in cultural production or cultural activities, labor relations in the context of cultural factors have been studied extensively (Brookes et al., 2011; Luqman et al., 2020), the labor of professional practice can be understood across several dimensions and systems of cultural value (McKay, 2014). From the perspective of cultural economy, cultural resources are factors of production that can be used to develop and create wealth and are various types of resources for cultural industries development activities, Bourdieu's theory of cultural production fields indicated cultural resources can be used in economic transactions and act as a form of cultural capital (Bourdieu, 1983). King (2011) offers a broad view of cultural resource management that includes archeological sites, cultural landscapes, historic structures, shipwrecks, scientific and technological sites, and objects, as well as intangible resources such as language, religion, and cultural values. From the type of form, cultural resources include tangible and intangible cultural resources or material and spiritual cultural resources; from the type of diachronic, cultural resources include historical and modern; from the type of territory, cultural resources include national and international; from the type of faith, cultural resources include religious and non-religious. The broad diversity and complexity of culture have determined the diversity and complexity of cultural resources. In a conclusion, cultural resources are the material achievements and spiritual wealth created in human cultural activities and are a series of resource systems with cultural attributes that can realize value multiplication. In this study, we tried to quantify the different types of cultural resources in a unified way using an index.

If cultural resources are factors of production and the objective is value production, the value realization of cultural resources is reflected in economic, social, and humanistic dimensions, among others. Xiang divides the evaluation of cultural resource development benefits into humanistic values, such as peculiarity, inheritance, identity, artistic, historical, and social values, and economic values, such as scale, investment, driving forces, industrial base, supporting services and prospect value (Xiang, 2015). Economic growth is a complex evolutionary process that is tightly integrated with sociocultural and political processes, economic and social systems co-evolve through the origination, adoption, and retention of new ideas, and in which creative industries are a key part of this process (Potts, 2009; Zhang et al., 2022). In the dual system and mechanism of China's cultural industries and cultural undertakings, a large number of public cultural resources are both economic resources and public goods, including cultural heritage and tourism resources, which are not only the supplies for the development of economic industries but also the supplies of social public culture. Services have the dual value of economic and social benefits. In the dual system and mechanism of China's cultural industries and cultural undertakings, a large number of public cultural resources are both economic resources and public goods, including cultural heritage and tourism resources, which are not only the supplies of economic and industrial development but also the supplies of social public culture. Services have the dual value of economic and social benefits (Saleem et al., 2021). The realization of the value of cultural resources has multiple dimensions, it involves culture, economy, social and wellbeing (Jian et al., 2019), which to a certain extent weakens the value of cultural resources only in economic production.

2.3. Cultural resources and cultural industries

Scholars have conducted empirical studies on the input-output efficiency of the cultural industries that showed great variation among different provinces. The overall efficiency of the cultural and creative industries is recognized low in China, environmental factors had significant effects on the development of the cultural industries in each region (Nusrat et al., 2021; Li et al., 2022). There are significant differences in the efficiency of cultural industries inputs and outputs in eastern, central, and western China. Zeng et al. (2016) consider that the scale of companies in the cultural industries is a key factor restricting development, the external environment has a great influence on this efficiency, the efficiency gap between the eastern, central, and western areas is obvious and reflects the degree of the environmental impact on the cultural industries in these regions. Unfortunately, these studies did not consider the impact of the core element of cultural resources on the input-output efficiency of the cultural industries.

A bunch of studies have shown that cultural resources with economic value can significantly contribute to economic growth and cultural industries development, and the results are focused on positive effects. First, all cultural factors in business that can be transformed into economic resources, such as capital and labor can be considered cultural capital (Bourdieu, 1980). Second, the stock of cultural capital can contribute to economic growth, and in the context of sustainable economic growth, cultural capital, human capital, and technical efficiency will become the main driving forces of China's economic development (Liu and Li, 2019; Bodhi et al., 2022). Third, cultural resources have spatially heterogeneous effects on the development of the cultural industries, cultural resources in tourist destinations are linked to the demand and availability in the medium term (Herrero-Prieto and Gomez-Vega, 2017; Gong et al., 2020).

However, specific cultural resources or cultural capital do not always show a positive association with the cultural industries. Different pathways of influence, heterogeneity of cultural resources, different market environments, and changing industrial factor conditions may result in differentiated development outcomes in the certain cultural industries. In classical economic growth theory and modern economic growth theory, cultural capital can indirectly act on economic development by constraining technological choice and institutional choice (David, 1975; Chang, 2011; Bisin et al., 2021; Qi et al., 2021). Meanwhile, more attentions are paid to the links between creative economy and local development, inequalities of opportunity and businesses of spiritual cultural capital have different influences on economic development from the perspective of cultural capital heterogeneity (Tubadji, 2014; Ballet et al., 2015), development of a creative economy can form an integral part of any attempt to redress inequality, provided that the process also brings about broader structural changes to ensure that creative workers are themselves not disadvantaged in relation to other workers (Boccella and Salerno, 2016), yet, the economy and the cultural industries of western China are still underdeveloped, the explanations for this are mainly due to the small scale of the enterprise, insufficient conditions to create demand, shortages of talent, and lack of investment capital for the cultural industries development (Fan and Xue, 2018; Fan and Zhang, 2019).

3. Distribution of the cultural resource curse

In the theory of the natural resource curse, the mainstream view describes the negative effect of natural resources on economic growth. Before proving the utility of the positive or negative effects of cultural resources on cultural industries development, we construct the cultural resource curse coefficient by referring to the natural resource curse coefficient (Lu et al., 2019; Yang and Song, 2019). The curse coefficient of cultural resources refers to the ratio of the proportion of regional cultural resources to the total national cultural resources to the proportion of the added value of the cultural industries in the region to the added value of the cultural industries in the country. This resource curse coefficient essentially explains the degree of comparative advantage of regional cultural resources relative to the development of cultural industries, it is used to measure the degree of deviation between industrial development and resource endowment in the region. The cultural resource curse coefficient is calculated using the following equation:

$$CRC_i = \frac{CR_i / \sum_{i=1}^{n} CR_i}{Cul_i / \sum_{i=1}^{n} Cul_i} \tag{1}$$

The cultural resources curse CRC_i indicates the deviation of cultural resources from the development of cultural industries in the region, n indicates the number of provincial administrative units in China, Cultural resources endowment index CR_i indicates the cultural resources endowment of the region i, Cul_i indicates the added value of the cultural industries in the region i.

When the cultural resource curse coefficient is larger than 1, the proportion of the region's cultural resource endowment in the country is larger than the proportion of the region's cultural industries added value in the country, the region's cultural resource endowment advantage is greater than the region's cultural industries development advantage, and the cultural resource endowment advantage shows a negative deviation from the cultural industries development advantage, which means that the region has a cultural resource curse. The larger the cultural resource curse coefficient is,

TABLE 1 Index system of cultural resource endowment.

Primary indicator	Secondary indicator
Public cultural resources	Number of libraries
	Number of museums
	Number of books in library
	Number of cultural centers
Intangible cultural heritage resources	Number of national-level intangible cultural heritage items
	Number of provincial-level intangible cultural heritage items
Tourism resources	Number of scenic spots of grade A or above
Local language resources	Number of dialects
Famous villages and towns resources	Number of famous villages and towns of the ministry of housing and construction

the more advantage a region's cultural resources have over its cultural industries, the higher the deviation of the development advantage from the endowment advantage, and the more serious the cultural resource curse is. When the cultural resource curse coefficient is less than 1, the opposite is true.

3.1. Cultural resource endowment index

Drawing on the indicators of cultural resources (King, 2011; Xiang, 2015; Zhou and Liu, 2019), we construct the cultural resource endowment index CR_i with nine secondary indicators in five dimensions, including public cultural resources, intangible cultural heritage resources, tourism resources, local language resources, and famous villages and towns resources. The composition of the cultural resource endowment index is shown in **Table 1**. Data are drawn from the China Statistical Yearbook of Culture and Related Industries, China Statistical Yearbook of Culture and Tourism, and the official websites of the Ministry of Housing and Urban-Rural Development of the People's Republic of China, China Intangible Cultural Heritage Website, and China Tourism Website. The cultural resource endowment index of each province in China is calculated by using the weighted TOPSIS method (Jahanshahloo et al., 2006).

3.2. Measurement of the cultural resource curse coefficient

According to Eq. (1), based on the data of the cultural resource endowment index and added value of the cultural industries, we measured the results of the curse coefficient of 29 provincial administrative units in China for 20 years from 2000 to 2019 (due to missing data for Xinjiang and Tibet, these two provinces are not included in the calculation) and calculated to get the average of 20 years for each province. To facilitate the comparison of the results, the country was divided into four subdivisions (Lu et al., 2019), including no-resource curse zone, resource curse edge zone, resource curse high-risk zone, and resource curse severe zone. The regional distribution of the curse is shown in **Table 2**.

In the no-resource curse zones, the cultural resource curse coefficient is less than 1, and the advantages of regional cultural industries development are greater than those of local cultural resource endowments. There are 8 provinces (cities), such as Shanghai, Beijing, Guangdong, and Fujian, in the no-resource curse zone. The no resource curse zone is mainly distributed in municipalities directly managed by the central government and some eastern regions, which have a high level of economic development, strong industrial foundation, superior market environment, and strong cultural industries development. Cultural industry in these regions is driven by market-oriented conditions, factor conditions, and innovation levels rather than cultural resources.

In the resource curse edge zone, the cultural resource curse coefficient is between 1 and 2, the advantages of cultural resource endowments in the region are slightly stronger than the advantages of cultural industries development, but the two do not show serious divergence. There are 13 provinces (autonomous regions), such as Hunan, Shandong, and Hainan, in the resource curse edge zone, accounting for approximately half of provincial units in China. Resource curse edge zones, which do not show obvious regional distribution characteristics, are distributed in the eastern, central, and western regions, where the development of cultural industries and cultural resource endowment is relatively balanced.

Regions with high risk and severe cultural resource curses have coefficients greater than 2, the development of cultural industries within these regions seriously deviates from the local cultural resource endowments, and the advantage of cultural resources is greater than the advantage of cultural industries development. The provinces with high-risk resource curses are mainly distributed in the western region and the two central regions of Henan and Shanxi, among which six provinces (autonomous regions), including Henan, Yunnan, and Heilongjiang, have resource curse coefficients between 2 and 4. Generally, their cultural resource endowments have not been transformed into the advantage of cultural industries development. Two provinces, Gansu and Qinghai, have resource curse coefficients greater than 4, at the most severe level. The development of their cultural industries is severely lagging, and the development of cultural industries and cultural resource endowment conditions are seriously inverted.

The regional distribution shows that the cultural resource curse generally exists in economically underdeveloped regions, while it generally does not exist in economically developed regions. This phenomenon suggests that the development of cultural industries in a region has a strong correlation with the local level of economic development, while it is only weakly correlated with the local cultural resource endowment.

4. Methodology

Many categories of industrial economy are in the industrial ecology that has spatial heterogeneity. Accurate identification of different regional industrial ecology, and reasonable allocation of resources are conducive to the sustainable industrial development, while unreasonable allocation of resources hinders industrial development (Xu et al., 2022). To further investigate the intrinsic causes of the cultural resource curse, we place cultural resources into the economic ecology of cultural industries, and we first empirically examine the influencing factors of cultural industries and then conduct an empirical test on the transmission mechanism of the cultural resource curse in western China, where the cultural resource curse is severe.

4.1. Research design and model setting

Based on extant study in the literature of resource curse (Atkinson and Hamilton, 2003; Fleming et al., 2015; Perez-Sebastian and Raveh, 2016; Corrocher et al., 2020; Hu et al., 2020), this study constructs an empirical model of the influence factors of the cultural industries, which covering cultural resources, and empirically examines the influence effect of cultural resources on the cultural industries by region. In this model, the added value of the cultural industries is taken as the explained variable, cultural resources as the core explanatory variable, and control variables covering cultural industries input factors, cultural institutional mechanism factors, and economic environmental factors. For the sake of data smoothness, we

TABLE 2 Regional distribution of the cultural resource curse in China.

Resource curse distribution	Threshold	Provincial area	Characteristic description
No resource curse zone	$CRC_i < 1$	Shanghai, Beijing, Guangdong, Tianjin, Zhejiang, Jiangsu, Chongqing, Fujian.	The development advantage of the cultural industries is stronger than that of the local cultural resource endowment, and there is no resource curse.
Resource curse edge zone	$1 \leq CRC_i < 2$	Hunan, Shandong, Hainan, Sichuan, Jilin, Hubei, Anhui, Liaoning, Ningxia, Jiangxi, Shaanxi, Guangxi, Hebei.	The advantages of cultural resource endowments are slightly stronger than the advantages of cultural industries development, but the degree of deviation between cultural industries development and cultural resource endowment is not high.
Resource curse high-risk zone	$2\ CRC_i < 4$	Henan, Yunnan, Heilongjiang, Inner Mongolia, Guizhou, and Shanxi.	There is a more serious deviation between cultural industries development and cultural resource endowment. The advantages of cultural resources have not been transformed into an advantage in the cultural industries.
Severe resource curse zone	$4 \leq CRC_i$	Gansu, Qinghai.	Cultural industries development is very weak and seriously deviates from the local cultural resource endowment conditions.

performed logarithmic treatment on some variables. The empirical model is as follows:

$$ln\_Cul_{i,t} = \beta_0 + \beta_1 CR_{i,t} + \beta_2 Input_{i,t} + \beta_3 Institution_{i,t} + \beta_4 Economic_{i,t} + \varepsilon_{i,t} \tag{2}$$

In the equation, the subscript i denotes the provincial administrative unit, the subscript t denotes the year, $Cul_{i,t}$ denotes the added value of the cultural industries in the year t in the region i, $CR_{i,t}$ denotes the cultural resources in year t in the region i, $Input_{i,t}$, $Institution_{i,t}$, and $Economic_{i,t}$ respectively, denotes the control variables of the three dimensions of cultural industries input, cultural institutional mechanism, and economic environment, β_0 denotes the constant term, β_1, β_2, β_3, and β_4 denotes the measured coefficients, and $\varepsilon_{i,t}$ denotes the random disturbance term.

The model applied panel data from 29 provincial administrative units in China over 20 years from 2000 to 2019, and panel data regressions usually involve mixed POOL models, fixed-effects FE models, and random-effects RE models. At the prior tests, we applied relevant methods such as F tests, BP Lagrange multiplier tests, and Hausman tests can determine the appropriate model settings, and to overcome heteroskedasticity and autocorrelation between variables, we include clustering robustness standard errors Robust in the model. The description of variables is presented in **Table 3**, the data are obtained from the China Culture and Related Industries Statistical Yearbook, China Statistical Yearbook, Marketization Index, and CNKI Data Service Platform.

Cultural resources can influence the development of the cultural industries by forming cultural commodities available for transformation into cultural capital and forming a cultural atmosphere. Cultural resource variables are based on the calculation of the cultural resource endowment index in the previous section. There are two input factors of the cultural industries, including labor input and financial investment, and both can affect the cultural industries directly. Chinese cultural institutional mechanism has the dual attributes of economic and social benefits, which are related to the development of the cultural industries. In this study, we include two variables: (1) the proportion of cultural undertakings expenditure to fiscal expenditure and the number of legal persons in the cultural, sports and entertainment industry; (2) the proportion of cultural expenditure to fiscal expenditure can better reflect the structure of the cultural institutional mechanism, the number of legal persons in the cultural, sports and entertainment industry reflects the scale of regional cultural entities. The level of local economic development affects the development of the cultural industries through the indirect effects of cultural demand, cultural consumption, and cultural production. We take per capita GDP to measure, the higher the level of local economic development, the stronger the demand and preference for culture and the more the economy can promote the development of the cultural industries. Considering the influence of the market environment on the development of the cultural industries, we followed the measurement of Fan et al. (2011) to measure the degree of market development. Additionally, the degree of openness is constructed by the number of foreign investment entities with access to products in each industry. Summary statistics are presented in **Table 4**.

TABLE 3 Description of variables.

Variable type	Variable name	Variable symbol	Variable meaning
Explained variable	Industry value added	In Cul	Logarithm of value added of cultural industries
Explanatory variable	Cultural resource	In CR	Logarithm of cultural resource endowment index
Control variable	Labor	In CL	Logarithm of labor input in cultural industries
	Financial investment	In CF	Logarithm of financial investment in cultural industries
	Cultural institution	PC	Share of cultural business expenses in fiscal expenditures
	Cultural legal person	In LP	Logarithm of the number of legal persons in culture, sports and entertainment industry
	Economic development level	In PGDP	Logarithm of GDP per capita
	Marketization	MI	FanGang marketization index
	Degree of openness	OP	Number of accesses to foreign products

TABLE 4 Summary statistics.

VarName	Obs.	Mean	*SD*	Min.	Max.
ln Cul	580	2.39	0.600	0.89	3.76
ln CR	580	−1.20	0.366	−3.00	−0.12
ln CL	580	1.51	0.735	−1.00	3.15
ln CF	580	2.01	0.688	0.00	3.38
ln LP	580	3.52	0.514	1.48	4.80
PC	580	0.46	0.118	0.23	0.90
ln PGDP	580	4.33	0.371	3.44	5.21
MI	580	6.35	1.950	2.33	11.71
OP	580	4.61	5.407	0.44	24.46

4.2. Empirical analysis and results

4.2.1. Stepwise regression

Table 5, we test the relationship between cultural resources and cultural industries, the stepwise regression results of Model 1 to Model 4. The result in Model 1 shows a significant positive correlation between cultural resources and cultural industries, but this is not sufficient to explain the influence of cultural resources on the development of cultural industries under different conditional environments. The results of the stepwise regression of Models 2, Model 3, and Model 4 show that cultural resource endowment does not have a significant impact on cultural industries development and that the results are robust. The results verify the standpoint that the association between regional cultural industries development and cultural resource endowment is weak in the analysis of the resource curse coefficient. Moreover, Model 3 and Model 4 indicate that cultural institutions have a significant inhibitory effect on cultural industries development, constraining the economic value of the cultural industries. Similarly, it happens in Italy, where heritage and intangible capital are important driver for economic and socio-cultural development, but the absence of systemic and integrated vision of cultural sector brings economic and social benefits which are inadequate to the fields potentiality (Simeon and Martone, 2014).

The result of Model 4 indicates that the level of regional economic development and the degree of marketization, financial investment, and the number of legal persons engaged in the culture industry can significantly promote its development. Therefore, in the more economically developed eastern regions, the economic environment, the level of marketization, and the factor conditions for the development of the cultural industries are more adequate, the transformation and utilization of cultural resources are higher, and the curse of cultural resources does not occur. Meanwhile, in our model, the effects of cultural labor input and market openness on cultural industries development are not significant for the whole country. One possible reason is that China's cultural industries is not at the stage of talent-driven and open development, the utility level of cultural labor input and the degree of openness of the market are still low and do not have a significant effect on the development of the cultural industries.

4.2.2. Subregional regression

Nowadays, the development and utilization of cultural resources should satisfy cultural and economic needs to assess the key conditions in the context of place attachment, the results of subregional regressions for the east, central and west regions are presented in Table 6, we can see the large differences in influence factors for cultural industries in different regions. Cultural resources have a significant positive impact in the east and a significant negative impact in the western regions. Due to the regional heterogeneity in the eastern, central, and western regions, the different regional economic development levels, market conditions, factor conditions, innovation, and creativity capabilities cause different levels of development and utilization of cultural resources. The strong development and utilization of cultural resources in the east show a significant positive impact of cultural resources on cultural industries and the weak development and utilization of cultural resources in the western regions do not. This finding supports the regional distribution results of the regional cultural resource curse.

In addition, there are different influences on the drivers of cultural industries in the eastern, central, and western regions. In the eastern region, the level of local economic development (GDP per capita) and the number of cultural legal persons have a significant positive influence on the development of the cultural industries, the cultural institution system has a significant negative influence on the development of the cultural industries, the cultural industries labor input, financial investment, the degree of marketization and openness show non-significant influences on the development of the cultural industries.

In the central region, the level of local economic development (such as GDP per capita), the cultural industries' labor input, and the degree of openness has significant positive effects on the development of the cultural industries, while cultural legal persons, the cultural institution system have significant negative effects on the development of the cultural industries. Cultural industries' financial

TABLE 5 Results of stepwise regression.

	(1)	(2)	(3)	(4)
	ln Cul	ln Cul	ln Cul	ln Cul
ln CR	1.306**	1.180	0.101	0.243
	(5.684)	(0.869)	(0.737)	(1.784)
ln CL		0.342*	0.201	0.104
		(2.048)	(1.441)	(0.704)
ln CF		0.484**	0.354**	0.229*
		(2.914)	(3.022)	(2.381)
ln LP			0.359**	0.175*
			(3.390)	(2.148)
PC			−0.670**	−0.751**
			(−3.685)	(−4.299)
ln PGDP				0.451**
				(3.701)
MI				0.043**
				(2.883)
OP				0.003
				(0.347)
Cons	3.953**	1.115**	0.546**	−0.441
	(15.150)	(4.661)	(3.006)	(−1.149)
Model setting	RE	RE	RE	RE
R^2	0.231	0.771	0.789	0.834
N	580	580	580	580

T-values in parentheses, $^*p < 0.05$, $^{**}p < 0.01$.

TABLE 6 Results of sub-regional regression.

	(4) National region	(5) Eastern region	(6) Central region	(7) Western region
	ln Cul	ln Cul	ln Cul	ln Cul
ln CR	0.243	0.424*	−0.173	−0.081*
	(1.784)	(2.441)	(−2.005)	(−2.092)
ln CL	0.104	−0.021	0.388**	0.158*
	(0.704)	(−0.157)	(5.156)	(2.175)
ln CF	0.229*	0.278	0.005	0.201
	(2.381)	(1.649)	(0.045)	(1.916)
ln LP	0.175*	0.247*	−0.250**	−0.082
	(2.148)	(1.986)	(−3.905)	(−1.150)
PC	−0.751**	−0.829**	−0.570*	0.048
	(−4.299)	(−2.987)	(−2.061)	(0.210)
ln PGDP	0.451**	0.657**	0.857**	0.652**
	(3.701)	(2.661)	(8.704)	(4.075)
MI	0.043**	0.015	0.034	0.061**
	(2.883)	(0.773)	(1.826)	(3.062)
OP	0.003	0.012	0.092**	−0.014
	(0.347)	(1.338)	(2.638)	(−1.773)
Cons.	−0.441	−1.165	−1.221**	−1.248*
	(−1.149)	(−1.898)	(−3.277)	(−2.477)
Model setting	RE	RE	FE	FE
R^2	0.834	0.781	0.745	0.650
N	580	220	160	200

T-values in parentheses, $^{*}p < 0.05$, $^{**}p < 0.01$.

investment and the degree of marketization have no significant effects on the development of the cultural industries.

In the western region, the GDP per capita of the local economic development level, the degree of marketization, and the labor input in cultural industries have significant positive effects on the development of the cultural industries, while cultural resources have significant negative effects on the development of the cultural industries. The financial investment in the cultural industries, the number of cultural legal persons, the cultural institution system, and the degree of openness in the development of the cultural industries are not significant.

4.3. Transmission mechanism of cultural resource curse

The theory of the natural resource curse hypothesis suggests that regions with the resource curse are often accompanied by a crowding-out effect on other resources such as human resources, technology, and innovation resources and resources in the manufacturing sector (Deng et al., 2014; Wen and Jia, 2022). In the case of the cultural industries, we explore how the cultural resource curse is transmitted in the western region from the crowding-out effect of cultural resources on human resources, innovation resources, and cultural utility resources.

Cultural resources have cultural attributes, regional culture has an effect on regional population and cultural labor supply on the one hand and human resources through cultural concepts and education

TABLE 7 Results of the transmission mechanism.

	E_{CL}	Edu	$E_{R\&D}$	PC
ln CR	0.179**	−0.051*	−0.005	−0.054
	(3.860)	(−1.977)	(−0.612)	(−1.840)
Control variable	YES	YES	YES	YES
cons.	0.223** (5.516)	0.207** (4.093)	0.039 (1.869)	0.380** (6.758)
Model setting	RE	RE	RE	RE
R^2	0.579	0.316	0.040	0.028
N	200	200	200	200

T-values in parentheses, $^{*}p < 0.05$, $^{**}p < 0.01$.

on the other hand (Vinogradov and Kolvereid, 2007; Yong, 2019). Meanwhile, human resources can significantly influence the growth of cultural industries (Sonn et al., 2019). Therefore, we take local cultural industries' labor and fiscal education expenditure as two indicators to measure human resources. To eliminate the scale differences between regions, we thus constructed two measurements, the number of local cultural industries employees as a share of the resident population (E_{CL}) and the share of local education expenditure as a share of fiscal expenditure (Edu).

Cultural resources also constitute the basis for the operation of creative industries and obtain their value from culture (Deng, 2011; Mao, 2020; Wu and Lin, 2021). The level of creativity is one of the key factors in promoting the cultural industries (Xu et al., 2021). We choose local R&D expenditure in science and technology as a measure of local creativity, the default assumption is that the higher the expenditure on scientific research in a region, the stronger the innovation capacity and thus the higher the creativity. Additionally, for the sake of the relative smoothness of interregional comparison, the share of local expenditure on scientific research to fiscal expenditure ($E_{R\&D}$) is applied as the measurement variable.

As mentioned in the previous theory, on the one hand, cultural resources have dual attributes of cultural industries and cultural undertakings. Cultural resources are among the components of cultural undertakings. On the other hand, the above theoretical and empirical discussion shows that cultural undertakings generally have inhibitory effects on the development of the cultural industries. We choose the share of funding for local cultural undertakings in fiscal expenditure (PC) as the measurement variable.

To test the robustness of the main empirical results, we used the degree of marketization (MI) and the degree of openness (OP) as control variables in the model and obtained empirical results demonstrating how the cultural resources curse is transmitted in the western region of China, as shown in **Table 7**.

The empirical results of the transmission mechanism indicate the following: cultural resources and cultural industries labor are positively related. Cultural resources can encourage the agglomeration of cultural workers and significantly promote the development of cultural industries by promoting the growth of cultural industries workers. Cultural resources are significantly negatively correlated with inputs from education resources. In the typical case of Sweden, urban, natural and cultural qualities are different sources of regional attractiveness and influence the growth of human capital (Backman and Nilsson, 2018), but the Chinese western regions are peripheral layer of the cluster innovation network in China (Liu et al., 2022), as a result, the western regions are not attractive to skilled and well-educated people. The Chinese western regions with abundant cultural resource endowments are often enable policymakers to rely on cultural resources for culture-related industries development and income growth. In the context of Chinese western regions, the important value of education, as well as human resources for cultural industries development are neglected, which in turn hinders the transformation, upgrading, and innovative development of the cultural industries.

In reality, the cultural industries in western regions tends to attract more low-skilled and low-educated laborers, who often engage in resource-intensive and labor-intensive primary cultural industries too early or too long, reducing their own needs for educational development and inhibiting local education expenditures and human resource upgrading. Moreover, in regions with cultural resource endowment advantages, the government tends to pour more finances into the utilization, development, and protection of cultural resources, forming a certain crowding out of expenditures for education, thus hindering the upgrading of local human resources. Cultural resources do not have a significant correlation with either the level of creativity or cultural undertakings. In contrast to the natural resource curse, the cultural resource curse appears to be different to the way natural resources crowd out science and technology innovation and manufacturing, while cultural resources may not crowd out cultural creativity or cultural undertakings.

The transmission mechanism of the cultural resource curse in western China suggests that an important reason for the cultural resource curse in the western region is that the cultural resource endowments attract more primary labor, while there is a local crowding-out effect on educational resources, which inhibits the upgrading of local human resources and thus hinders the development of the cultural industries.

5. Conclusion and discussion

The study attempts to demonstrate the existence of the cultural resource curse. Draw on the resource curse theory, we measured the cultural resource curse based on 29 provinces in China from 2000 to 2019. To further explore the causes and possible transmission mechanism of the curse of cultural resources, we examine the influence of cultural resources on cultural industries and the crowding-out effect of cultural resources on other resources. The findings show that the resource curse is more serious in the economically less developed western region, and cultural resources harm the cultural industries in the western region. Refereeing from the experience of the curse of Chinese cultural resources under the modern development of the cultural industries, the key factors that determine the development of the cultural industries include economic factors, industrial input factors, and market environment factors, rather than depending on the degree of abundance of cultural resource endowment. We further found that the curse of western cultural resources is because western cultural resources attract a large primary labor force, which has a crowding effect on educational resources and hinders the upgrading and innovation of cultural industries.

5.1. Theoretical implications

Our research has certain theoretical significance. The study on the curse of cultural resources expands a new theoretical framework for the research on the relationship between cultural resources and the development of cultural industries. This study makes three theoretical contributions. First of all, cultural resources are a complex system of public cultural resources, heritage resources, tourism resources, language resources, etc., we define the scope of cultural resources from a broad perspective, which provides a research perspective for the analysis of the components of cultural resources and lays the foundation for the study of the curse of cultural resources. Second, our study confirmed the existence of the curse of cultural resources in the development of cultural industries, the theory of place attachment and cultural field illustrate the regional differences when cultural industries are taken account into an industrial ecosystem, so cultural resources have different influence effects and transmission mechanisms on the regional development of cultural industries. Specifically, we compared the impact of cultural resources on the development of cultural industries in China from four dimensions: cultural resources, industrial factor input, cultural institutional factors, and economic development level factors. We found that the impact of cultural resources is unfavorable to the development of western cultural industries. The empirical results are helpful to the resource-dependent development model of cultural industries, which is not conducive to the formation of comparative advantages of cultural industries development. Third, Examining the crowding-out effect of cultural resources on other resources from the aspects of government spending on educational resources, innovation resources, cultural undertakings resources, etc., provides a research direction for exploring the causes of the cultural curse resources.

5.2. Practical implications

The research results have important practical significance for clarifying the relationship between cultural resources and cultural industries development. The study results have a reasonable strategic focus on the development of the cultural industries, balance the economic and social benefits of cultural resources, and improve the utilization efficiency of cultural resources, the development and utilization of cultural resources should not only balance the relationship between culture and economy, but the development of cultural industries should also pay attention to cross-regional and cross-cultural territorial diversity.

First, it is often difficult to achieve ideal results in the development of cultural industries by developing cultural resources in economically underdeveloped areas. Blindly developing existing cultural resources or vigorously developing new cultural resources such as scenic spots and cultural facilities cannot effectively promote the development of local cultural industries. Excessive development and utilization of cultural resources result in a waste of resources, crowding out an investment that can be used for educational resources, which in turn inhibits the upgrading of human resources, thereby hindering the development of cultural industries.

Second, the strategic focus of cultural industries development in different regions is different. All regions should give top priority to economic development, promote the increase of residents' income, and take the expansion of cultural consumption demand as the priority for the development of cultural industries. In addition, we suggest that the eastern region should take the development of cultural resources and the expansion of cultural legal persons as the strategic focus of cultural industries development. The central region should promote the opening of the market and increase the input of the labor force in the cultural industries as a strategy for the development of the cultural industries. The western region should focus on improving the degree of marketization and promoting the growth of human resources in the cultural industries.

Third, given the dual system and mechanism of the country's cultural industries and cultural undertakings, in the economically developed regions, such as the eastern region, the degree of marketization is high, and it is easier to stimulate the economic benefits of cultural resources. The policy of accelerating the market-oriented reform of cultural undertakings is reasonable, but in economically underdeveloped regions such as the west, the vitality of the cultural economy and the guarantee of public cultural services still mainly depend on cultural undertakings. Before the cultural market has matured, it is not appropriate to carry out the market-oriented reform of cultural undertakings prematurely.

5.3. Limitations and future directions

Despite novel contributions, our research is not without limitations. First of all, cultural resources are a broad concept and system. Our definition of cultural resources may be biased toward the endowments left by historical and traditional cultural resources such as geography and humanities. Art and cultural resources such as music and painting, as digital cultural resources such as media and digital collections, are not included, and the sampling scope of future cultural resources is still recommended for future scholars to investigate, at the same time, cross-environmental and cross-cultural psychology perspective is also worth to more concern. In our empirical models, we consider the four dimensions of the cultural industries, which are more suitable for the development characteristics of China's cultural industries. Future researchers should extend our findings with more cultural dimensions appropriate to the other regions or countries. In addition, control variables can be selected based on the context and characteristics of the region. For example, in the European Union (Moore, 2014) or the United Kingdom (Garnham, 2006), cultural industries are called as creative industries, which mainly highlight economic activities which are concerned with the generation or exploitation of knowledge and information, and thus control variables related to creativity can be selected, and cultural industries in Japan and South Korea tend to focus on the private sector (Otmazgin, 2011; Li X. et al., 2021; Wang et al., 2022; Zhou et al., 2023). Furthermore, technology and copyright play an increasingly important role in cultural industries, and future research should consider these explanatory variables. Our research has confirmed the existence of the curse of cultural resources in the development of cultural industries. However, how to break the curse of cultural resources and transform the curse of cultural resources into the blessing of cultural resources is still the suggestion of future scholars.

Data availability statement

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

JZ contributed to the design of research themes, research framework and the theory, and to the summary of the conclusion. ZX contributed to collecting data and the empirical study, and to the validation of the conclusion. YL contributed to the literature review and edited the article. All authors discussed the results and commented on the manuscript.

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Conflict of interest

ZX was employed by the Shenzhen Qijing Consulting Services Limited Company.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Exploring the mechanism of empathy on lens language and linguistic landscape on movie-induced tourism: The moderating effect of cultural differences

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Since the development of film-induced tourism, scholars have increasingly shifted their attention to examining film-induced tourism from different perspectives. However, little research has been devoted to the underlying mechanisms by which audiences empathize with movie scenes. Current research believes that the lens language of movies is helpful for the communication between the movie and the audience. It not only helps the audience to shape the imagination of the movie scene, but also contributes to the construction of a virtual language landscape, and promotes the audience's cognition of the movie scene. Bringing their emotions and self-expression into the story ultimately enhances the audience's perception of where it was filmed. In exploring the framework of the transformation of empathy in lens language to landscape language, cultural differences are also proposed as the boundary conditions for the relationship between lens language and empathy. Structural equation modeling with PLS-SEM was employed to test the proposed hypotheses. The findings suggest that lens language positively predicts language landscape and empathy positively mediates the aforementioned relationship. Furthermore, the interaction term of cultural differences amplifies the relationship between lens language and empathy. Finally, we discuss theoretical and practical implications.

KEYWORDS

movie-induced tourism, lens language, linguistic landscape, empathy, cultural difference

1. Introduction

Visual centrism considers an important concept of image cognition in Western cultures but has rarely been theoretically tested. With the development of modern streaming media and visualization, visual centrism has begun to invade traditional consumption and affect the customer and tourist experience (Qiu et al., 2018; Li et al., 2021; Zhou et al., 2023). In the process of tourism's development, the cultural image of tourist destinations has become an important marketing concept, which affects tourists' attitudes towards destinations and corresponding consumption behaviors in various ways (Li and Katsumata, 2020; Bodhi et al., 2022), For example, tourism planners attract increasing numbers of tourists by constructing chic cultural images for the destinations they manage. In the context of this industry development, the vigorous development of streaming media has promoted the combination of visual centrism and tourism (Busby and Klug, 2001). The integration of visual centrism and tourism promotes film-induced tourism. The original intention of the scene content of the movie in the streaming media is not to attract tourists to the shooting location, but to use the language landscape as the background of the movie to indirectly influence the audience (Wyatt and Badger, 1990). The positive link between movies and tourism is based on the fact that movies can be shown to millions of audiences in a short period, which can leave a good initial impression on moviegoers in tourist destinations (Cao et al., 2018; Yang et al., 2022).

For an existing tourist attraction, a blockbuster movie and a group of well-known actors can bring a great publicity effect (Beeton, 2006; Wu and Lai, 2021). Compared with targeted tourism advertisements and promotions, movie shooting location promotion can influence more target groups with less capital investment and promote tourism consumption (Carl and Smith, 2007; Gong et al., 2020a,b). Hence when tourist destinations lack publicity funds, film-induced tourism is a cost-effective marketing method during economic downturns, and more and more scholars have shown strong interest in research in this field. The success of film-induced tourism stems from the audience's admiration for the celebrities in the film. In short, because fans want to witness the scenery experienced by their idols, they spend correspondingly on tourism (Yen and Teng, 2015). Some moviegoers yearn for the real scene constructed by the movie, and this image will inspire them to travel (Hudson and Ritchie, 2006). For example, few scholars have argued that film-induced tourism stems from viewers' perceptions of target images, including the visual language contained in television, film, and other mass media (Connell, 2005). Most of the existing studies on film-induced tourism only focus on the attractiveness of the cultural image of the destination, and there are relatively few studies on how film-induced tourism occurs through audience empathy.

The relationship between tourism and the media comes from the space constructed in the film, such as the shot of the space setting, the narrative setting, and the geographical relationship in the setting (Shiel and Fitzmaurice, 2011). This relationship mimics the concept of lens language defined by Metz (1974). According to this lens, the connection between the tourist destination and the lensed media is likely to stimulate tourists' expectations about tourism (Polianskaia and Rdu, 2016) and enrich their imagination (Torres and Momsen, 2005). The audience's imagination is based on the metaphorical expression of the lens language and then turns to the emotional expression of the tourists themselves. In other words, the lens language first affects the audience emotionally, and empathy transforms this physical change into a language landscape, which may stimulate the audience's motivation to travel through it.

In sum, this study examined the notion of language of the lens in the field of tourism studies through the underlying mechanisms of audience empathy and the results of the linguistic landscape that may connect audiences' imaginations to tourist destinations. The lens language uses editing and shooting to create emotional metaphors (Zembylas, 2004; Khalid et al., 2021a). We argue that empathy intervenes in the lens language and helps viewers express emotions (Moudatsou et al., 2020), which in turn triggers artificial language landscapes (Anpilova et al., 2020). The interpretation of lens language is not only limited to the narrative technique itself but also seldom examined from the language landscape of the tourism perspective. This study aims to bridge the gap between tourism and film, connect the virtual language landscape imagined by tourists with the lens language of film shooting, realize the audience's empathy for film-induced tourism, and deepen our understanding of travel motivation, for the follow-up Research on film-induced tourism provides a theoretical reference.

2. Literature review and research hypotheses

2.1. Movie-induced tourism and linguistic landscapes

With the accelerating pace of life, people have started to enjoy the spiritual realm to overcome and get relief from the pressure of life. Pop culture, with its high commercial value and consumerism, has become a spiritual oasis for people, balancing the efficiency of form with the quality of spiritual enjoyment (Duff, 2002; Khalid et al., 2021b). This change in thinking affects tourism development because, at present, tourism planners are preemptively interested in constructing the destination image by using mass media as a marketing tool to attract tourists, as a combination of visuals and tourism (Beerli and Martin, 2004; Karpovich, 2010). This is in contrast to the traditional tourism approach that focuses on the physical space (Gunn, 1988; Baloglu and McCleary, 1999; Tapachai and Waryszak, 2000). The advantage of mass media-based marketing is that it allows for a quick emotional connection to be built between the tourist and the destination, giving birth to movie-induced tourism (Busby and Klug, 2001; Luqman et al., 2022; Luqman and Zhang, 2022).

Movies attract audiences through vivid and interesting stories and infectious sensory stimulation, which builds audiences' interest in shooting locations (Chen, 2018). With the movie-induced tourism industry boom, its related theories have become a hot topic of academic research. For example, Evans (1997) argues that "film and television tourism operates in a way that it first appears on the screen and then stimulates tourists to visit these sites and attractions." Similarly, Riley et al. (1998) defines it as, "the far-reaching influence and spiritual impact on tourists by motivating them to visit locations shown in the shot through the enhanced spectacle of film, television, literature, magazines, records, videos, etc. By reviewing the prior literature, this study defines movie-induced tourism as travel to places by tourists who are attracted by the scenes and locations shot in films. This suggests that the movies strengthen the audience's knowledge of the travel destination by bringing them a powerful shock to carry out tourism activities toward the shooting location (Evans, 1997; Riley et al., 1998). With the continuous upgrading of the film industry in recent years, movie-induced tourism is gradually becoming a new consumption hotspot in today's society, and the scenes presented also attract more and more tourists for sightseeing (Ryan, 2009; Luqman et al., 2021; Nusrat et al., 2021).

A language is a human-specific tool used to express people's thoughts and emotions (Risselada, 2019), while films create an immersive artistic space used to convey virtual feelings (Hahm et al., 2008). They rely on technological means to help those virtual emotions break the limits of physical space and provide a full-sensory experience to the audience (Soler-Adillon and Sora, 2018). This process requires a suitable medium, technology, materials, and artistic language (Carl et al., 2007; Luqman et al., 2020a). The film work creates a new aesthetic space in the interaction process with the audience, which not only transcends human-computer interaction but also achieves the continuation and expansion of physical space. As compared to the rigid insertion of tourism promotion in the film, the linguistic landscape conveyed by the lens language in the film can bring more impact to the audience. Based on this, the study proposes the following hypothesis.

> *H1*: In movie-induced tourism, the lens language has a positive effect on the production of tourism linguistic landscapes.

2.2. Lens language and emotional metaphors

The film is one of the most dynamic contemporary immersive art forms (Jones and Dawkins, 2018), and its existence draws on digital media such as the language of the camera. Specifically, the film conveys to the viewer, a culture formed by the fusion of the fields of scene perception, event perception, and narrative understanding (Luqman et al., 2020b; Du and Gong, 2022). As an artistic language, lens language works directly on the audiovisual senses of the audience (Metz, 1991), and conveys emotions with visual and concrete images, which has a strong artistic impact (Hao and Ryan, 2013; Bettetini, 2018).

In 2004, the Task Force of the 2nd International Conference on Language and Social Psychology focused on the relationship between language and emerging communication technologies (Hadar and Lian, 2004). They explored how individuals achieve effective alternation through language with or without the presence of various nonverbal cues, which is a core issue in the study of lens structure technologies. This issue is also reflected in topics such as immediate affective expression (Walther, 2012) and the management of online conversations (Foster et al., 2008). With the development of communication systems, system developers have provided new cues and representations of audiences' emotional expressions (Wuertz et al., 2018; Masood et al., 2020). These are presented in films through the unique design of lens structures, giving audiences a distinctive sense of viewing and emotional attachment. Research addressing lens language in the film will continue to advance the exploration of the core issues of using lense language in other technical contexts.

Current research in the field of lens design technology is still contentious. However, the long-standing debate in this field is mainly related to language's psychological and communicative impact when people do not communicate directly in person (Walther, 2004). The study of the communicative element of language is reflected in film in terms of the visual perspective, dissecting the structure of shots, and interpreting pictures and films. In other words, the lens language recording of the film shooting includes the cinematographer's perception of the captured images and the emotions that the director wants to convey to the audience (Bader et al., 2017; Masood et al., 2022). The filmmaker tells the audience a story through the lens, leading them to comprehend the film's connotations (Bednarek, 2015). The lens language of film often contains an interplay of emotions (Wang and Cheong, 2006). In the study of cognitive linguistics, emotion composition includes cognition and language. Moreover, the form of emotion produced is divided into metaphor and metonymy, where metaphor is regarded as an effective cognitive means of conceptualizing abstract categories (Nie, 2006). Emotion is the most common and important experience in the human life process, there exists an interaction between human cognition and emotion (Kotz and Paulmann, 2011). Emotion is also a very complex and intangible phenomenon, while metaphor is a universal cognitive device that is more ubiquitous (Rickards and Lauren, 2015). Thus, we can say that emotional metaphors are about understanding abstract emotions and experiences through some concrete evidence (Emanatian, 1995; Lubart and Getz, 1997). The lens language of films also contains emotional metaphors, calling the role of emotional metaphors in the lens language as empathy (Kim and Richardson, 2003), which is a technical term in the field of psychology recognized as the ability to identify with and understand the situation of others (Decety and Svetlova, 2012; Decety et al., 2016). This reflects the emotional, cognitive, and conceptual aspects of human connection to achieve mutual recognition (Kerem et al., 2001; Saleem et al., 2021). The audience feels the emotions conveyed by the filmmaker through the lens language, thus triggering their empathy for the film was shooting location. Hence, the study proposes the following hypothesis.

> *H2*: In movie-induced tourism, the lens language has a positive effect on the production of the audience's empathy.

2.3. Emotional expression and virtual linguistic landscape

Emotion is an important component of real linguistic communication, and emotional expression can be linguistically connected to studying the subjective components of language (Kunzmann and Richter, 2009). Furthermore, emotional expressions highlight the scientific laws of social practice, and emotions serve as people's attitudes towards things around them and their activities (Wong and Law, 2017). Therefore, emotional expression can be regarded as a process of stimulating people's aesthetic psychology and imagination through vivid imagery and language. It also has a very prominent role in the construction process of the virtual linguistic landscape.

Linguistic landscapes are rooted in the connection between people and travel destinations (Katz, 2018). These linguistic landscapes are shaped as a process of understanding the world, expressing ideas, and thus influencing others (Olwig, 1996). At the same time, it allows the ideas to be conveyed more clearly (Burenhult and Levinson, 2008). With time, people not only focus on the material aspect of their needs but also aim at their emotional needs (Stamboulis and Skayannis, 2003; Ning, 2017). Thus in the development of linguistic landscapes, virtual landscapes are created to accommodate the multifaceted needs of tourists (Miklós et al., 2019). Furthermore, the virtual linguistic landscape has high ornamental and artistic value, which breaks through the limitations of temporal and spatial territory. Therefore, it is suitable for viewing, entertainment, and learning (Giordan et al., 2017). Such findings show that the shaping of a virtual linguistic landscape is based on the needs of tourists, and the semiotic language it contains will change with the changing needs of tourists. It is the outward manifestation of tourists' empathy. Hence, the study proposes the following hypothesis.

> *H3*: In movie-induced tourism, the audience's empathy has a positive effect on the construction of the tourism linguistic landscape.

2.4. The mediating role of empathy

Empathy is the ability to map the feelings of others onto one's nervous system (Lamm et al., 2010). The discovery of mirror neurons suggests that the nervous system can map the observed behavior of others onto its premotor cortex, which is a response to emotional action (Depow et al., 2021). The current definitions of empathy by researchers are divided into the following three main categories: first, Ickes (1993) proposed that empathy is an ability to interpret the thoughts and feelings of others accurately; second, empathy is a mental process in which individuals experience the emotional feelings of others through perception, understanding, and imagination (Singer and Lamm, 2009;

Schurz et al., 2021; Zhang et al., 2022). Third, empathy is an ability to experience the intrinsic cognitive-emotional feelings of others based on their perspectives, which results in an emotional state consistent with others (Hoffman, 2008). Moreover, state empathy is a process during information processing that consists of three dimensions: affective empathy, cognitive empathy, and associative empathy (Shen, 2010). Empathy is no longer a single cognitive or affective function but a process consisting of many closely related but distinct states of mind (Khanjani et al., 2015). When individuals activate the subject's representations of states, situations, and objects, the associated somatic responses are automatically activated (Nummenmaa et al., 2008) is where the role of empathy truly arises. The empathy establishment is conducive to audiences from different cultural backgrounds to interpret the natural scenery and humanistic sentiments presented in the film. This further creates an emotional connection with the filmmakers, allowing emotions to be internalized in the language logic of different cultural backgrounds, thus enabling the audience's ordinary movie-watching needs to empathize with their consumption needs of tourism (Tucker, 2016).

From the audiences' perspective, the empathy process is used to describe the emotional connection mechanism integrating the movie-induced industry. While the mediating role of empathy arises mainly due to the change of identity from the audience to tourist, the motivation shift from viewing to travel, and the change of demand from interest to expectation (Yi et al., 2022). In other words, the film footage editing and the camera movement during filming can evoke the audience's emotional response and promote the audience's empathy for the film, which is the embodiment of the mediating role of empathy. Thus, the study proposes the following hypothesis.

> *H4*: In movie-induced tourism, the audience's empathy is a mediating factor in the construction of tourism linguistic landscapes influenced by lens language.

2.5. The influence of cultural differences

Different individuals internalize society's norms, rules, and values, and their reflections on society directly influence the individual's determination of behavior feasibility and rationality (Tyler, 2021). We refer to this shared perception of the social environment as culture, which shapes how individuals behave, interact, and establish relationships with others (Markus and Kitayama, 2010). Cultural differences exist in how people think, influenced by different languages and customs (Heelas, 1984; Heine and Renshaw, 2002; West et al., 2022). The role of cultural differences in communication is often demonstrated by comparing two cultural archetypes, which include individualism and collectivism (Richter et al., 2016). Collectivist cultures are characterized by family integrity, group membership, and strong solidarity, emphasizing interdependence between people (Lam et al., 2009). In contrast, in individualistic cultures, individuals consider themselves independent (Chu and Choi, 2011), with an emphasis on self-reliance, competition, distance from the in-group, and hedonism (Holliday, 2009). Asian cultures such as China and Korea, which have Confucian backgrounds, exhibit higher levels of collectivism, while individualism is more common in Western cultures such as the United States.

Cultural differences may hinder tourism on a superficial level, and the lack of proper communication between scenic managers and tourists may affect the quality of services. But nowadays, more and more travel destinations are consciously exploiting cultural differences to develop their markets. These markets are according to the differences in tourists' way of thinking, thus enhancing economic and social benefits (Streimikiene et al., 2021). Such reflection is also seen in movie-induced tourism. Suppose the plot of a movie is in line with consumers' value orientation and can satisfy different cultural needs through abundant movie scenes. In that case, the impact of movie-induced tourism can be maximized. This further shows the importance of the cultural differences of the audience in marketing.

Culture is also closely related to language. Although culture imposes certain restrictions on the meaning and form of language, language is still the most direct reflection and transmission vehicle, which is also the essence of culture (Varnum et al., 2010). Therefore, the role of language as a mediator is necessary to achieve the transmission of all cultures. Moreover, pragmatic empathy in cross-cultural communication is the ability of people with different cultural backgrounds to communicate emotionally and understand intentions from the other person's perspective (Ruben, 1976; Gudykunst and Kim, 1984). This study considers the role of pragmatic empathy in culture, determining how the communicative parties can step out of stereotypes brought by culture and avoid conflicts that arise from cultural differences (Young, 2020). Pragmatic empathy is manifested in cultural differences as the two parties of communication respect each other's cultural background, customs, and intentions of words. Based on this, the study proposes the following hypothesis (Figure 1).

> *H5*: In movie-induced tourism, cultural differences influence the contribution of lens language to the tourism linguistic landscape as a moderating variable.

3. Research design

We have designed two studies in this article based on the above literature review and research hypotheses. The first study explores the logical relationship between the lens of language and linguistic landscape through the role of empathy. While the second study adds cultural differences as a moderating variable to the first study to investigate the effect of cultural differences on pragmatic empathy in different countries. Both studies considered a survey-based approach to verify the empathy production of the participants. The authors modified the existing established scales in the context and content of this study. The empathy scale is designed drawing from empathy scale of Tian and Robertson (2019), which contains 10 items. Similarly, the film lens language scale is designed based on the study of Wong and Lai (2015) study of celebrity-induced tourism, which selected the dimension of celebrity attractiveness and designed four items. Moreover, the virtual linguistic landscape scale is drawn from Zhang et al. (2015) landscape experience perception scale, selecting two dimensions of the natural landscape and cultural landscape, and designing a total of six items. Lastly, drawing from cross-cultural difference scale of Reisinger and Turner (1998), this study designed the cultural difference scale selecting three dimensions of tourists' cultural values, social rules, and preferences, resulting in a total of eight items. Likert scales were used to design

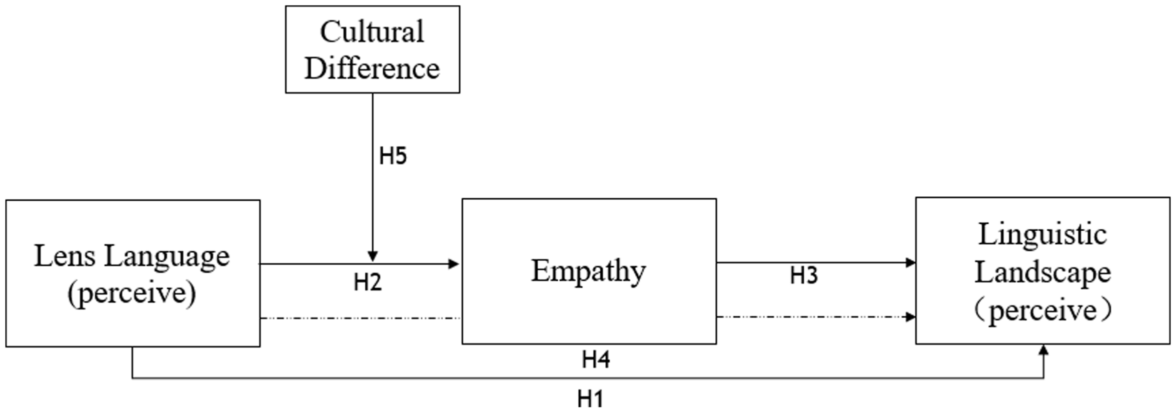

FIGURE 1
Empathy model in movie-induced tourism.

the questionnaires, where "1" means strongly disagree, and "5" means strongly agree.

4. Research 1: Lens language and linguistic landscape under the influence of empathy

4.1. Research methods

This study used online collected data methods, considering online professional platforms to distribute and collect questionnaires. We employed PLS-SEM software for the empirical analysis of the data. We first watched random films to ensure the research's feasibility and provide a basis for the follow-up surveys. Second, we documented the natural and humanistic landscapes recorded by the lens language. Lastly, we conducted data statistics on social media platforms such as Weibo and Xiaohongshu. The results showed that the delicate camera portrayal in the films inspired most tourists to visit the film shooting location to hit the real scene. To ensure the validity and effectiveness of the questionnaire, 10 participants with a greater interest in movies and tourism (on average, they watch movies once a month or travel once a month) were selected for a survey before the formal distribution of the questionnaire. The survey results showed that the participants were impressed by the movies' natural scenery and humanistic sentiments. Moreover, the metaphorical lens language was no longer enough to meet their spiritual needs, and their willingness to go to the real scene for direct emotional expression gradually increased.

Based on the survey results, we collected participants' demographic information, taking into account the influence of factors such as gender, occupation, level of education, and other conditions on their interest in movies and tourism. Although a total of 350 questionnaires were distributed in this study, and 331 valid questionnaires were obtained after eliminating the invalid questionnaires with random or missing answers and inconsistencies. The effective recovery rate was 94.6%. Among the overall valid samples of the study, 45.3% were Chinese participants, and 54.7% were participants from other countries. Furthermore, the responses obtained comprised 69.5% males and 30.5% females. The research participants were mainly undergraduate students (accounting for more than 70% of the total), so the sample data were relatively authentic.

4.2. Findings

Figure 2 presents the results of SEM. The results confirm that the factor loadings for each proposed construct are greater than the 0.6 threshold limit. In addition, we removed certain items due to low factor loadings <0.6, which strengthened the reliability and validity of our proposed scale.

Table 1 showed the explanatory power of the tested models. The R^2 value for the tourism language landscape was 0.850 and the adjusted R^2 value was 0.849. Additionally, empathy had an R^2 value of 0.204 and an adjusted R^2 value of 0.202. The results show that each latent variable has better explanatory power for the tourism language landscape and empathy. In addition, the NFI of the model was 0.685, indicating that the model fit of Study 1 was good.

Table 2 presented the standardized values of the reliability and validity of constructs. The Cronbach's alpha coefficient for the tourism linguistic landscape was 0.947, rho_A was 0.950, the composite reliability (CR) was 0.957, and the average extracted variance (AVE) was 0.789. The Cronbach's alpha coefficient for empathy was 0.919, rho_A was 0.959, the CR was 0.937, and the AVE was 0.748. The Cronbach's Alpha coefficient for lens language was 0.912, rho_A was 0.919, the CR was 0.938, and the AVE was 0.792. Our results confirmed that Cronbach's alpha coefficient of each latent variable is greater than 0.9, the CR is greater than 0.9, and the AVE of each latent variable is greater than 0.5 indicating that each latent variable has good reliability. From the above analysis, it is clear that the model fits well as a whole, the internal latent relationships have significant explanatory power, the estimation effects are all acceptable, and the reliability indicators fit with the structural validity.

The T statistic of each path coefficient was calculated by using the bootstrapping method, and the significance level of the path coefficient was tested (two-tailed test). The specific parameters are shown in Table 3. The T-statistics of the SEM in the Bootstrapping test show that all path coefficients have high T-statistics, with Empathy → Tourism language landscape at 7.435, Lens language → Tourism language landscape at 29.614, and Lens Language → Empathy at 8.103. The value

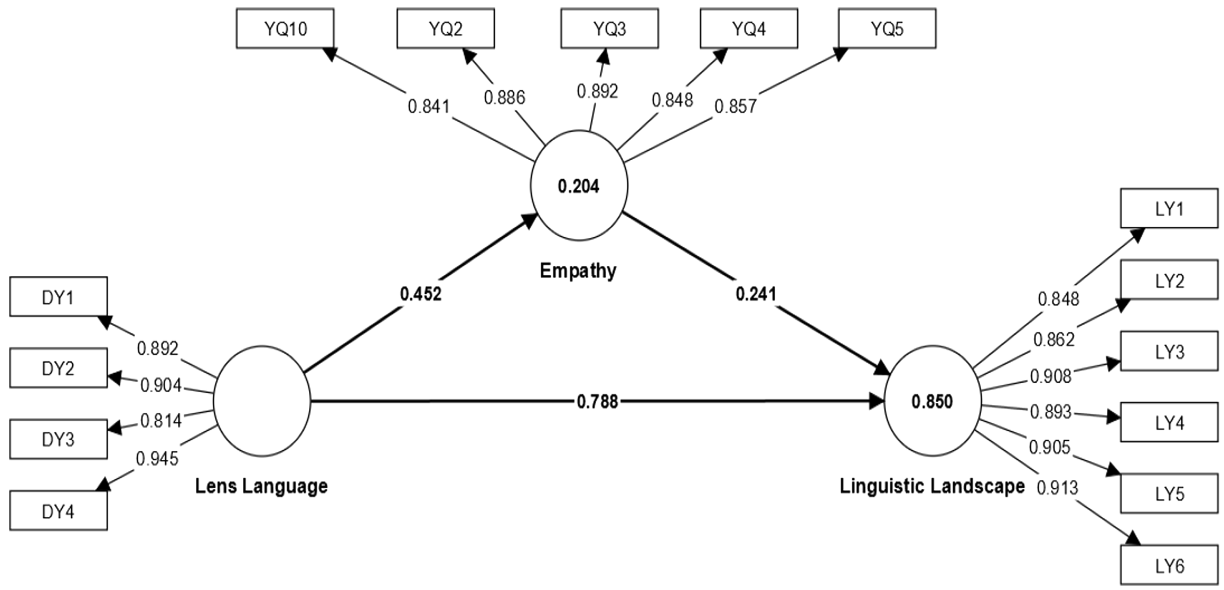

FIGURE 2
Construction of structural equation model.

TABLE 1 Predictive power of the model.

	R^2	Adjusted R^2
Tourism linguistic landscape	0.850	0.849
Empathy	0.204	0.202

TABLE 2 Reliability tests of latent variables.

	Cronbach's Alpha	rho_A	Composite reliability	AVE
Tourism linguistic landscape	0.947	0.950	0.957	0.789
Empathy	0.919	0.959	0.937	0.748
Lens Language	0.912	0.919	0.938	0.792

of p of each path is less than 0.05, indicating that the path coefficient is above the corresponding significance level test, and the model structure is stable.

4.3. Discussion

Based on the feedback from the above research data and the construction of SEM the following conclusions were drawn.

First, it can be seen through Table 3 that the path coefficient of lens language → tourism language landscape is 0.788, with a p-value of 0.000, indicating that lens language has a significant positive influence on tourism linguistic landscape. Indicating that the use of lens language to express film storylines with specific meanings can largely enrich the visual effect of films. And lens language as an artistic language, its strong artistic appeal directly affects the audience's audio-visual organs, helping the audience to generate strong emotional feedback, and the audience pins this emotion on the tourist language landscape. Hypothesis H1, namely, the language of the shot has a positive impact on the generation of the tourism language landscape in film-induced tourism is verified.

Second, it can be seen through Table 3 that the path coefficient of lens language → empathy is 0.452 with a p-value of 0.000, indicating that lens language also has a significant positive effect on empathy, suggesting that under the design of the filmmaker, the editing of the footage gives the film works a rich emotional mindset, shortens the psychological distance of the audience while conveying various sentiment, helps the audience to immerse themselves in the film, stimulates the audience's empathy for the film shooting place, and promotes their tourism consumption. Hypothesis H2 that the lens language has a positive effect on the production of the audience's empathy in movie-induced tourism is verified.

Third, Table 3 shows that the path coefficient of empathy → tourism linguistic landscape is 0.281 with a p-value of 0.000, indicating that empathy has a significant positive effect on the tourism linguistic landscape. That is to say, the emotional resonance generated by the audience when seeing the film may contain an association with the travel destination, and the established story relationship between characters and scenes in the movie will transform that emotional resonance into a sense of identification with the film shooting location. The hypothesis H3 that the audience's empathy has a positive effect on the construction of the tourism linguistic landscape in movie-induced tourism is verified.

Fourth, Table 3 shows that the path coefficient of lens language → empathy → tourism linguistic landscape is 0.109 with a p-value of 0.000, indicating that empathy plays a significant mediating role in the construction of tourism linguistic landscape by lens language. That is, the audience's perception of lens language may facilitate the emotional connection with the travel destination, making them anticipate sitting in the movie scene just like the movie characters.

Hypothesis H4 that the audience's empathy is a mediating factor in the construction of tourism linguistic landscapes influenced by lens language in movie-induced tourism is verified.

TABLE 3 Significance test results of path coefficients.

	Initial sample (O)	Sample mean (M)	Standard deviation (STDEV)	T-statistic (|O/STDEV|)	*p*-Value
Empathy → Tourism linguistic landscape	0.241	0.242	0.032	7.435	0.000
Lens language → Tourism linguistic landscape	0.788	0.786	0.027	29.614	0.000
Lens Language → Empathy	0.452	0.451	0.056	8.103	0.000
Lens language → Empathy → Tourism linguistic landscape	0.109	0.110	0.022	4.986	0.000

5. Research 2: Cultural differences influence empathy in movie-induced tourism as a moderating variable

5.1. Research methods

Study 2 also employed online methods to collect data, uses online professional platforms to issue and collect questionnaires, and uses PLS-SEM software to conduct an empirical analysis of data. Based on the investigation in Study 1, it was found that cultural differences formed under different education, age, and experience conditions also have an impact on the generation of pragmatic empathy. Accordingly, empathy for cultural differences in language was added as a moderating variable to Study 2.

The revised questionnaire distribution and recovery in study 2, taking into account the impact of language barriers on different nationalities, collected demographic information of different project participants by adding items such as nationality and distributed the questionnaires to participants of different nationalities. A total of 360 questionnaires were distributed, and 334 valid questionnaires were obtained after excluding random or missing or inconsistent invalid questionnaires, with an effective recovery rate of 92.8%. In the entire valid sample, 58.1% were Chinese participants, 41.9% were from other countries, 56.6% were male, and 43.4% were female. More than 70% of the total sample was comprised of undergraduate students.

5.2. Findings

Figure 3 presents the results of SEM. The results confirm that the factor loadings for each proposed construct are greater than the 0.6 threshold limit. In addition, we removed certain items due to low factor loadings <0.6, which strengthened the reliability and validity of our proposed scale.

Table 4 shows the moderating role of cultural differences in promoting the occurrence of the tourism language landscape through film lens language. Table 4, tested whether cultural differences, as a moderating variable, contribute to the occurrence of tourism linguistic landscapes by film lens language. It is found that the interaction term between lens language and cultural differences positively influences the tourism linguistic landscape with an unstandardized coefficient of −0.285, a *p*-value less than 0.05, and a T-value of 6.536. It shows that cultural differences positively moderate the relationship between film lens language and linguistic landscape until they reach a certain point. Specifically, the stronger the cultural difference, the stronger the impact of lens language on the language landscape, but when this influence reaches a certain level, cultural differences have a negative moderating effect, that is, the lower the cultural difference, the stronger the impact of lens language on the production of language landscape stronger. The details are shown in Figure 4.

5.3. Discussion

As we expected, the moderating effect of cultural differences on the association between lens language and tourism language landscape in film-induced tourism was confirmed (i.e., H5). In particular, we find that cultural differences actively moderate the contribution of lens language to the language landscape of tourism up to a certain point. After a tipping point or threshold point, cultural differences will have a negative regulatory effect. That is to say when cultural differences have less influence on the audience, the lens language will enhance the audience's perception of the tourist language landscape when watching the film. Moreover, when the cultural differences of the audience have a greater influence, the lens language will reduce the audience's perception of the tourism language landscape. Therefore, our findings suggest that cultural differences can be reflected in real-world conditions such as language barriers for communication and inconvenient transportation when traveling, which can reduce audiences' willingness to travel and reduce their identification with the language landscape.

6. Research conclusion

6.1. Discussion

Movie-induced tourism is gaining more and more public attention. This paper uses empathy as the intermediary and cultural difference as the moderating variable to explore the impact mechanism of lens language on film-induced tourism and analyze its internal development mechanism. The landscape as a natural visual frame forms a dominant ideologically entrenched set of ideas. However, the landscape presents much more than that. For example, Lefebvre et al. (2004) describes social space as a landscape not just as a place with well-defined physical boundaries, but as a set of relationships, practices, and imaginations. The structure of the camera can not only beautify the language of the scenery

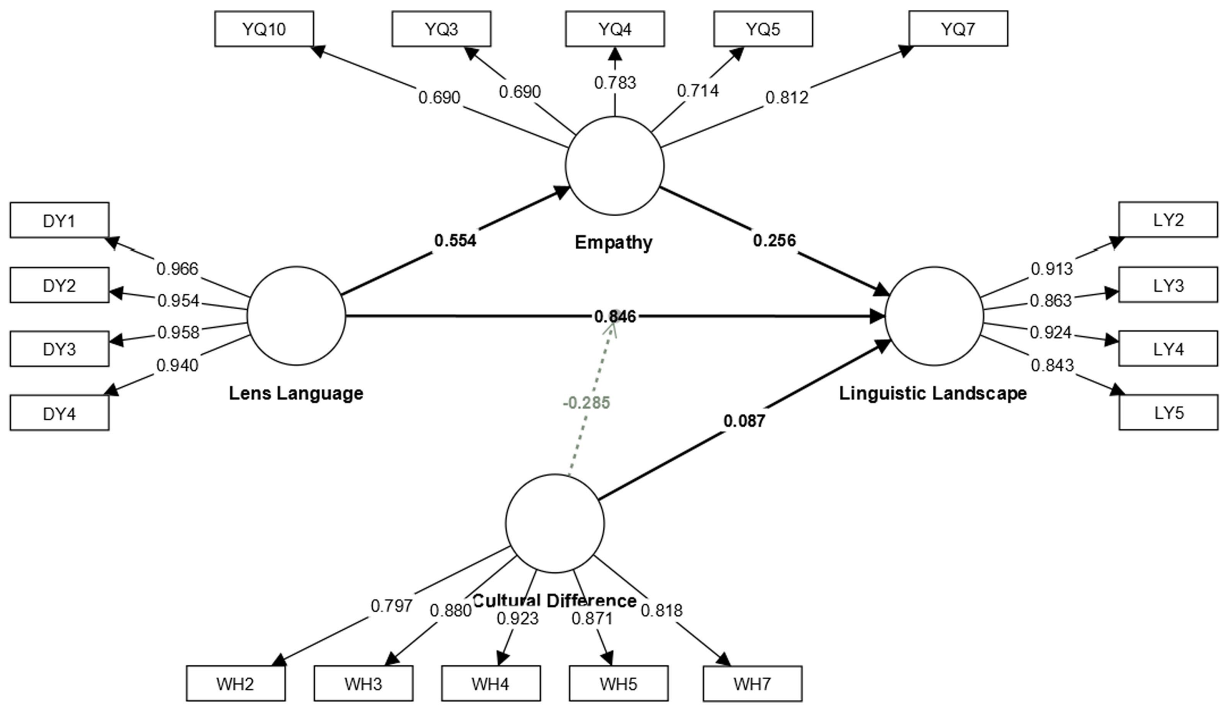

FIGURE 3
Construction of structural equation model.

TABLE 4 Significance test results of path coefficients.

	Initial sample (O)	Sample mean (M)	Standard deviation (STDEV)	*T*-statistic (|O/STDEV)	*p*-Value
Cultural differences → Tourism linguistic landscape	0.087	0.083	0.040	2.199	0.028
Lens language → Tourism linguistic landscape	0.846	0.843	0.038	22.224	0.000
Lens language → Empathy	0.554	0.557	0.034	16.211	0.000
Empathy → Tourism linguistic landscape	0.256	0.257	0.031	8.248	0.000
Moderation effect 1 → Tourism linguistic landscape	−0.285	−0.283	0.044	6.536	0.000

but also deepen the artistic creation through the audience's imagination and actions. Under this specific framework, the film endows the landscape with special connotations and meanings through dramatic conflicts, making it even more mysterious. It also explores how the lens language constructs virtual spaces and how audiences perceive them to realize the connection between film and tourism.

Given the complexity of cultural differences, critical and careful thinking must be considered when examining the impact of cultural differences on such frameworks, both when analyzing the relationship between the two identities of viewer and visitor. Although in common sense, individuals present isolated cases, they can often represent a real region to a certain extent, and can also objectively evaluate the different advantages of different cultures. Therefore, this paper uses empathy as the mediator and cultural differences as moderating variables to explore the language conversion mechanism under film-induced tourism.

Our research finds that the shift from lens language to language landscape does indeed motivate viewers' willingness to travel. The concept of virtual landscape realizes the collision of imaginary terrain and physical space, making people realize that tourism practice and fantasy can jointly shape living space. For example, under the packaging of a movie, a backward village can become a hotspot, driving the local tourism economy. All the recurring images in the movie scenes have the potential to become popular tourist attractions. This is a trend, and the attraction comes precisely from the language of the film.

6.2. Theoretical implications

It is well known that camera language under the influence of empathy contributes greatly to the development of film-induced tourism, so this paper makes the following theoretical findings.

First, the use of language landscapes in tourism research is still novel and rare in the context of cultural tourism (Hao and Ryan, 2013). The

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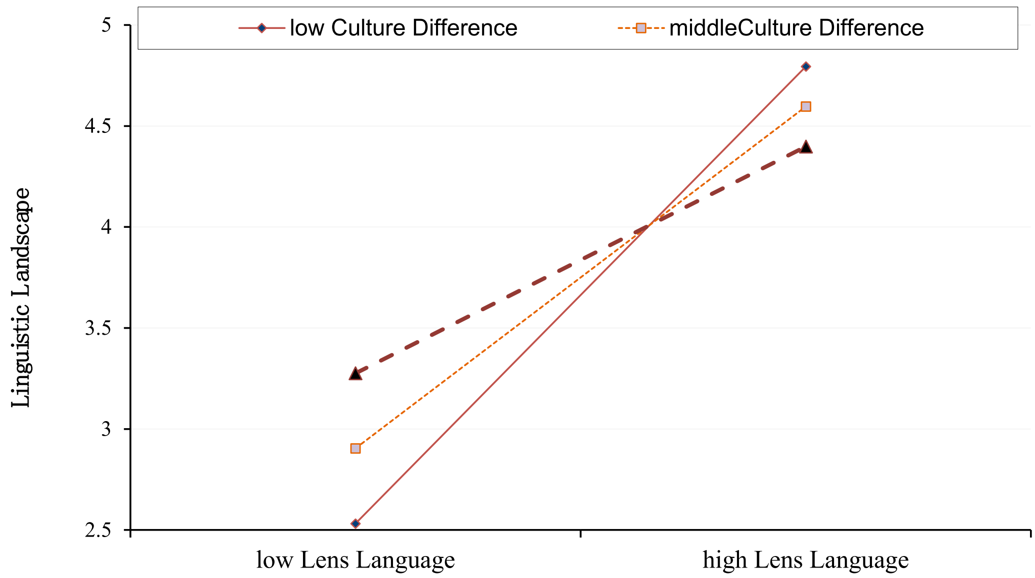

FIGURE 4
Culture difference as a moderating variable between tourism linguistic landscape and lens language.

lens language is composed of pictures and videos, which provides a new direction for tourism research, that is, to cut into the interpretation of visual factors and conduct in-depth research on tourism.

Second, the lens language of the film enriches the characterization, strengthens the storyline, and attracts the audience through the frame of the film, the setting of the scene, and the alternation of long and short shots. However, the virtual space created by the lens language is immaterial and metaphorical. Pragmatic empathy can well prove the existence of this emotional metaphor and enrich the exploration of the inner mechanism of film-induced tourism.

Third, many studies on film-induced tourism or the relationship between film and tourism are based on cultural identity, where shared values are more likely to generate the same willingness to travel. This article enriches the study of the cultural context in film-induced tourism by addressing cultural differences that emerge before audience intent, examining the impact of different languages and values on empathy.

6.3. Practical implications

First, travel and film are both sources of aesthetic material that can engage the public and help people understand and meet the needs of others. Filmmakers can skillfully use the lens language of movie scenes to inspire audiences to engage in a dialog based on the plot of the movie. The lens language is applied to the narrative of the movie, and editing techniques such as montage are used to construct the movie scene. If the scene in the movie is a mainstream tourist destination, the lens language can strengthen the audience's perception of it; if the scene in the movie is not a mainstream tourist destination, the movie can build a bridge between the audience and new tourist attractions, spark their imagination by forming a special virtual space.

Second, research on lens language interpretation of film shots can help tourism destinations and policymakers understand the complexity of the dimensions of tourists' imagination. But film tourism destinations are often imagined and reconstructed into surreal scenes by the audience in the film narrative, and sometimes their semiotics or image interpretation will negate the authenticity of the sights, and a correct understanding of the film provides a way to avoid distortion when interpreting the language of the lens.

6.4. Limitations and future research

Although this paper contributes to the development of film-induced tourism, it cannot be denied that it still has certain limitations. First, this paper examines the audience's perception of the lens language in the process of emotional expression and the audience's attitude towards the virtual landscape. This paper only considers the pragmatic empathy generated by the audience in the cinema, ignores whether tourists who have already gone to the destination are affected by pragmatic empathy, and the scope of research is not broad enough. At the same time, the exploration of the lens language structure is not deep enough, and the feedback on the lens language transformation is only manifested in the audience's emotional changes, without considering the role of lens structure and lens design variables on the lens language, resulting in insufficient rigor and should be more in-depth. Subsequent research could also examine similarities and differences between the perceptions of linguistic landscapes and tourism virtual landscapes by tourists on film-induced tourism. Second, film-induced tourism-related experiences are all influenced by different societies, cultures, languages, and religions, and the proposed influence of cultural differences was found incidentally during the research process, and the single moderating variable explored is not rigorous enough. Therefore, future research on film-induced tourism should try to introduce multiple moderator variables for in-depth research.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

YZ contributed to the empirical work, the analysis of the results, and the writing of the first draft. ZX, LC, YH, and YZ support the entire work of YZ, and ZX suggests the development of hypotheses. The authors discuss the results and comment on the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Tourism destinations and tourist behavior based on community interaction models of film-enabled tourism destinations

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The importance of media-induced tourism has increased in the latest decade. The integration and collaboration of film elements is an especially effective pathway for the innovative development and upgrading of the experience of the cultural tourism industry. Existing studies on the mechanism of tourism destinations and cultural tourism development, mainly from the perspective of tourism destinations and tourist experience, have rarely explored the cultural tourism development mechanism from the perspective of interest-related community interaction in the film-enabling context. In this study, we conducted high-frequency word analysis and element category analysis of the online text data of the Japanese animation film *Your Name* from the angle of interest-related community interaction through utilizing online text analysis and Grounded Theory analysis. Based on the interest-related community interaction, we analyzed the elements of interest-related community interaction in cultural tourism triggered by the film, including tourist hotspots, tourism resources, the tourist experience, sightseeing expectations, tourism evaluation and information dissemination, and formulated the orientation pathway of film-enabling cultural tourism. In this study, we aimed to enrich cultural tourism research and provide a reference point and theoretical support for film-enabling cultural tourism in the Internet era by introducing the concept of interest-related community innovation to the scene of film-enabling cultural tourism.

KEYWORDS

cultural tourism, interest-related community, film-enabling, tourism experience, grounded theory

1. Introduction

With the vigorous development of cultural tourism, the combination of cultural factors with tourism destinations, such as sports, music and film with tourism destinations, has become an important development in the current cultural tourism industry (Ferreira et al., 2022; Hwang et al., 2022; Jin et al., 2022). Film can induce tourism behaviors, thus the "film + cultural tourism" model is also favored by both destination hosts and tourists: for example, Japan, Thailand, and the U.S. have become popular film-enabled tourism destinations (e.g., Busby et al., 2013, p. 571; Wen et al., 2018, p. 218; Du et al., 2020, p. 367). The innovation of Internet technology has broken the limitation of communities in time and space, and consequently, more and more film lovers gather due to their similar interests and hobbies, form a community of shared film interests, and become inheritors and promoters of film culture. Interest-related community is a virtual social relationship based on shared interest. It is a community with both traditional community cohesion and modern vitality.

With mature techniques, vivid stories, beautiful human settings and industry-leading picture quality, the Japanese animation film *Your Name* released in 2016 won a warm response from Chinese consumers. With the continuous upsurge of film popularity, the tourism industry derived from it developed rapidly. After the original filming location of *Your Name*, Nagano in Japan, was successfully selected as one of the top 10 best tourism destinations by the United States news channel CNN, a vast number of film lovers became fascinated with the place, and the cohesion of the interest-related community was also improved greatly. According to Japanese media reports, Hida City of Gifu-ken in Japan, one of the shooting places, despite its remote location, witnessed an influx of Chinese tourists after the film was released. The number of foreign tourists doubled, and about 80% of them came for the holy land tour mentioned in *Your Name*. As the data provided by the Hida Tourism Association indicated, the number of tourists in Hida City exceeded 1 million in 2016 (April 2016–March 2017) and reached 1.13 million in 2017, creating an economic benefit of 18.5 billion yen for Gifu-ken where Hida City is located in a short time. There were 6,984 foreigners out of the 1 million tourists in 2016 who stayed for accommodation, up 27.3% year on year. Among them, Hong Kong, China's Mainland and Taiwan were the top three regions where the tourists came from. Data released by the Japan National Tourism Organization showed that a total of 30 million foreign tourists visited Japan in 2018, 14 percent of whom went to Japan because of the attraction of the anime (Chen et al., 2021, p. 1040).

The research into interest-related community is of great academic and practical value to tourism destination management and marketing (Taecharungroj, 2022; Wong et al., 2022). Therefore, it has become a focus of the film and television industry to study the enabling mechanism of film and television cultural tourism based on the rules of interest-related community interaction, and it has also become an important topic discussed by academia. The mechanism of promoting cultural tourism development through the community interaction of shared film interest also triggered deep thinking on the "film and television + cultural tourism" model (Du et al., 2020; Marques de Sousa et al., 2022). Over the last decades, various incentives have emerged in cultural tourism research, especially in cultural tourism motivation research and tourist destination marketing research (Cuccia and Rizzo, 2011 p. 590; Connell, 2012, p. 1009; Coshall et al., 2015, p.1617; Boyd, 2022, p. 220). In terms of tourist destination marketing, emotional appeal is the most popular incentive, and it is a major strategy to "tell stories." Story marketing encourages audiences to form a positive image of the tourist destination in their minds through inspiring stories and plots in the film, and the audiences are guided to learn more about and to visit the tourist destination (Li and Liu, 2020, pp. 382–383; Li et al., 2021, p. 1810). In addition, researchers have recognized the role of tourist participation the tourism experience and behavior (Kim et al., 2017, p. 869; Chen and Rahman, 2018, p. 10; Chen, 2021, p. 1911). Most studies on film culture tourism explore the tourists' perception and behavior of film tourism through the participation of tourists (Kim et al., 2019b, p. 285) or celebrity attachment (Tengand Chen, 2020; Thelen et al., 2020, p. 292). Some scholars have divided the impacts of tourist behaviors on film tourism into two stages, namely, the "production period" (the direct impact of filming activities during film production) and "post-production" (the film tourism activities and experiences generated by the influx of film tourists after film production and the subsequent public relations of film tourism). Existing studies have shown that the authenticity of films and celebrity attachment plays a crucial role in the process of tourism activities triggered by films (Wong and Lai, 2015, p. 163; Liu et al., 2021, p. 2941).

At present, the vast majority of studies on film tourism focus on Western cases, and few involve Asian film tourism cases (Rittichainuwat et al., 2018, p. 1275). With the innovative development of global films, film production is no longer dominated by Western media, and Asian culture is also more widely disseminated through films. Although there are a great number of studies on film and television cultural tourism, few of them have been conducted from the perspective of interest-related community interaction (Kirillova et al., 2019; p. 270; Rather et al., 2019, p. 520). With the development of Internet technology, Internet users have transformed from passive readers to active content creators. They have built an online virtual tourism community, and their online communication has generated the so-called user-generated content (UGC), and the interest-related community has shaped an open and shared tourism experience (Du et al., 2020, p. 367).

Given the above consideration, the current study applied online text analysis and element coding of Grounded Theory to conduct high-frequency word analysis and element category analysis toward the text data of the Japanese animation film *Your Name*. The ROST-CM6 software was used to crawl the online text review data in China. In view of the keyword characteristics of the text data, the acquired data were divided into perspectives of the tourist destination hosts and the tourists, and the top 30 high-frequency words in terms of interactive discourse frequency were conceptualized to form a core generic category, and their generic analysis was conducted through three-tier coding (open coding, relational coding, and core coding). Furthermore, in line with the characteristics of tourism activities between China and Japan, combining the film-enabling tourism characteristics from the perspective of the tourist destination hosts and the tourists, this study proposed the elements of the interest-related community interaction of cultural tourism triggered by the film *Your Name*, namely, tourist hot spots, tourism resources, tourist experiences, sightseeing expectations, tourism evaluation and information dissemination, and finally a film tourism enabling pathway was generated based on the interest-related community interaction, thus providing theoretical support and reference for the exploration of film-enabling tourism mechanism in the Internet era.

2. Literature review and research hypotheses

2.1. Cultural tourism

Cultural tourism can be defined as "the movement of persons to cultural attractions away from their normal place of residence, with the intention to gather new information and experiences to satisfy their cultural needs" (Chen and Rahman, 2018 pp. 153–163; Li and Katsumata, 2020, p. 20; Pérez García et al., 2021, p. 315; Yang et al., 2022) and involves "tourists experiencing and having contact with a host population and its cultural expressions, experiencing the uniqueness of culture, heritage and the characters of its place and people" (Lynch et al., 2011, p. 979). This definition implies that cultural tourism allows tourists to engage, explore, and enjoy the difference of tourism destinations and the way they compare to their own home identities, encouraging self discovery (Mueller et al., 2009, p. 65).

The literature has emphasized that earlier cultural tourism emerged from the development and operation of cultural resources, such as heritage tourism, religious tourism, and folklore tourism (Cisneros-Martinez and Fernandez-Morales, 2015, p. 776; Figini and Vici, 2012, p. 837; Ruiz-Ballesteros and Hernández-Ramírez, 2007, p. 680) Socio-cultural impacts of tourism result from the interactions between people. Tourists interact with service staff, tour leaders, other tourists, and local residents (Minkiewicz et al., 2014, p. 33; Weiler and Black, 2015, p. 367). Additionally, the interactions are not limited to people. Tourists also interact with objects in environments based on experiences, such as sports, heritage sites, music, and even specific atmospheres (Li and Katsumata, 2020, p. 20; Ferreira et al., 2022, p. 337; Minkiewicz et al., 2014, p. 30–59; Prebensen and Foss, 2011, pp. 11). Thanks to changes in technology, increasing productivity has made it possible for more cultural resources to enter the tourism market, such as theme parks and film culture (Connell, 2012, p. 1009; Hu et al., 2021). Therefore, cultural tourism has become a major market in the tourism industry.

Cultural tourism has been a core element of the tourism industry for destination marketing and promotion (Du et al., 2020; Li and Katsumata, 2020). However, most studies focus on either residents' views or tourists' interest in cultural tourism. Few studies have focused on the interaction between residents and tourists in the context of film-enabled tourism. Second, cultural tourism is mostly represented by visiting historical sites and museums, and there is a lack of research that combines it with new cultural communication channels such as movies and music. Månsson highlighted the importance of the convergence of a range of media products in propelling tourism (Marques de Sousa et al., 2022, p. 526). Therefore, the introduction of film elements into research is conducive to promoting the development of tourism.

2.2. Film tourism

The term "film tourism" originated from the United Kingdom and the United States in the 1990s, originally referring to a new type of tourism formed by combining film and television bases with characteristic tourism (Riley, 1998, p. 922). It caters to the needs of contemporary tourists who pursue novelty and desire to combine knowledge, appreciation and dream-seeking psychology. Meanwhile, it integrates organically film elements into the tourism industry to form tourism products that can be seen, felt, and experienced (Kim, 2018, p. 262).

In the literature on film-induced cultural tourism, extant research has been dominated by locational shoots in either the U.S. or UK. The early highlight of the western market is partly explained by the dominance of Hollywood in filmmaking (Connell, 2012, pp. 1007–1,009). In the past two decades, empirical evidence reports that film production is no longer dominated by the US media but is increasingly shifting toward Asian market (Nanjangud, 2019, p. 5; Lin et al., 2021; Nakayama, 2021, p. 70; Wang et al., 2021, pp. 717–719). Academia and industry show increasing interest in Asian culture, and the development and transmission through film is encouraging the wider transmission of geography and socio-cultural values, all of which create significant implications for the tourism sector. One of the earliest papers to explore the potentially lucrative effects of film tourism for a destination was that by Cohen (1986), who recognized the power of film in motivating tourist demand. Similarly, research also argued that the influence of film and television on tourism destinations would increase (Du et al., 2020, p. 367).

Film tourism activities include reenacting scenes, tasting the food and beverages that appeared in the film, and experiencing the culture represented therein (Kim, 2012, p. 389). This type of experience is unique (Terzidou et al., 2018, p. 309). Connell outlined a range of product and service innovations in the retail, catering and accommodation sectors (Connell, 2012, pp. 1007–1,009). Examples of themed innovation of products include hotel packages with inclusive film tours, production of souvenirs, stage set or studio tours, themed food and drink, and photography opportunities at key film sites. However, at present, the combination of film and tourism is no longer limited to product innovation. The Internet has eliminated the boundary between them. Individuals have formed an interest-related community in the network society and built a new virtual relationship network. The barriers associated with film culture communication and tourism activities have been broken. Film elements based on the interaction of interests have offered tourism activities an innovative format. Scholars have pointed out that it may not simply be films that create tourist interest but the consumption of a number of media products and consumer-to-consumer interactions. Therefore, research into the film-enabling tourism mechanism of interest-related community interaction has become a new topic of great significance.

2.3. Interest-related community

The idea of community is predicated on a collective sense of common interests and purpose. Members of a community are bound together through comradeship and a desire to seek one another out. In the past, communities were based, at least in their conception, on proximity: members lived near one another (Lysloff, 2003, pp. 233–236). Fischer further elaborated on the role of social networks in residents' life, pointing out that residents living in non-adjacent areas form a group through specific relationships (such as common interests or hobbies, common values, etc.), thus forming their own social networks (Fischer, 1977, pp. 764–767). A community coheres through the common interests, ideals, and goals of its membership.

Furthermore, virtual communities are defined as aggregations of Internet users who form webs of personal relationships. Virtual communities have their own cultures and expectations (Kannan et al., 2000, pp. 415–416). The community stays together by adhering to the values and norms of the group (Spaulding, 2010, pp. 38–39). The Internet lays the groundwork for community by providing access to sustained communication, informational resources, and most importantly, a common locus for members to gather. Internet communities have emerged, despite temporal and spatial displacements, because they are formed entirely out of social relationships that are very real to members: relationships emerging out of communication, exchange, common interests and purpose, and mutual commitment. Boisvert and Milette (2009) proposed from the perspective of "Collective Intelligence" that members may shift from one community to another as their interests and needs change and they may belong to more than one community at the same time. Yet, they are held together through the mutual production and reciprocal exchange of knowledge (Boisvert and Milette, 2009, pp. 183–185). Scholars also noticed the social exchange phenomenon of interest groups in online interactions. Baker pointed out through participatory observation of rock fans in the virtual community that the exchange of objects may solidify bonds within the group (Baker, 2012, pp. 519–521). These objects that are bought, traded, and gifted will likely reflect the values and norms of the particular culture. And the resulting transactions serve to strengthen the community purposes of sharing information and resources and to connect the members, sometimes in intimate friendships that develop to pursue and enjoy activities.

2.4. Research hypotheses development

Given the above review, the current domestic research into online communities is still limited to concept analysis, and few studies have explored the development, interaction and maintenance of social relations among members of virtual online communities in depth. Meanwhile, film tourism is presenting a new format in the "Internet plus" era, but there is a lack of studies on the integration and development of film elements and tourism activities in the new media environment. Based on the Tourism Gaze Theory, taking the Japanese animation film *Your Name* as an example, this study explored the characteristics of the tourist destination hosts and tourists through the discourse construction analysis of the film interest-related community and discussed the interactive characteristics of the interest-related community in the process of film-enabling tourism in combination with travelling forms in order to make an in-depth exploration of the internal mechanism of film-enabling tourism. Specifically, the current study focused on the following issues:

> Q1: Analysis of film-enabling tourism characteristics from the perspective of the tourist destination hosts;
>
> Q2: Analysis of film-enabling tourism characteristics from the perspective of tourists;
>
> Q3: Exploration of the pathway mechanism of film-enabling tourism.

3. Research methodology and sample selection

3.1. Research context: Your name

Your Name is a youth film directed by the famous Japanese animation director Makoto Shinkai, demonstrating the classic theme of emotional development of the characters in the context of changes in time and space. Reflecting the strong filming style of Makoto Shinkai, it is rich in animated scenes that reflect real life and real-life filming locations. It has sparked a large-scale cultural tourism trend, and it is a key case for cultural tourism research. *Your Name* tells a story of exchanging souls through time and space. Miyamizu Mitsuha, a young girl living in the countryside of Japan, and Tachibana Taki, a young boy living in Tokyo, exchange souls through dreams, experience each other's lives, and generate subtle feelings for each other. The whole setting integrates multiple dimensions such as dreams, time, and space, and this is expanded on in the plot twists and the depth of thought of the film, and this contributes to the popularity of the shooting sites as tourism destinations.

The analysis of discourse characteristics is an effective way to explore the interaction rules of interest-related community. The current study mainly applied the ROST-CM6 software to conduct online text analysis, excavated the whole network data of the Japanese animation film *Your Name*, and thus reproduced and built the discourse structure of the interest-related community. Besides, Grounded Theory was adopted to analyze the film-enabling tourism characteristics from the perspective of the tourist destination hosts and the tourists and to further explore the overall characteristics of the film-enabling tourism mechanism. The data samples from the whole network can effectively reflect the characteristics of topics about film and tourism, map the characteristics of the interest-related community,

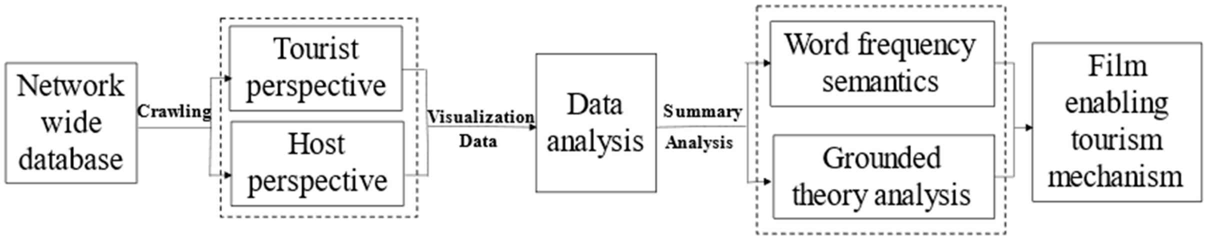

FIGURE 1
Technical route.

and reflect the characteristics of the film-enabling tourism mechanism. This study therefore randomly collected 20,567 pieces of information from 2 December 2016 to 2 August 2020. These samples were mainly from platforms like Weibo, WeChat, Today's Headlines, portal websites, etc. During this period, the development trend of discourse was gentle and stable, and this could reflect the issues discussed in this study. After completing data collection, the authors cleaned and sorted out the data by manually eliminating the wrong data, incomplete data, advertisements and other text materials irrelevant to the research to ensure the accuracy and reliability of the research results, and finally 20,074 entries of valid text data were obtained.

3.2. Research framework

The technical route of problem exploration in this study is shown in Figure 1. First of all, the ROST-CM6 software was used to crawl the whole network data to lay the analysis foundation for the research; Second, in view of the crawled keyword characteristics, the acquired data were divided into two groups from the perspective of the tourist destination hosts and the perspective of tourists, and the two groups were summarized and analyzed in line with Grounded Theory; Finally, on account of the characteristics of Chinese and Japanese tourism activities, and in combination with the film-enabling tourism characteristics from the perspective of the tourist destination hosts and the perspective of tourists, the film-enabling tourism mechanism was explored, and research conclusions and suggestions were put forward.

4. Data analysis and research results

4.1. High-frequency words analysis

In line with textual attribute characteristics, 20,074 entries of valid data were divided into perspectives of the local gaze and tourist gaze, of which 9,789 belonged to the local gaze and 10,285 to the tourist gaze. The researchers then used the ROST-CM6 software to segment the text data under the two perspectives and conducted high-frequency vocabulary analysis through keyword analysis. Finally, the top 30 words by frequency of use were selected for demonstration. Specifically, Table 1 shows the top 30 keywords based on their interactive discourse frequency within the interest-related community from the perspective of the tourist destination host. They were as follows animation world, revivifying, China, industry, resource, travel, culture, city, scene, beautiful scenery, search, art, music, guidance, animation, hotel, fine, restaurant, Tokyo, learn, inherit, brand, team, Makoto Shinkai, Suga Shrine, Gifu-ken, stunning, breakthrough, animism, and traverse. Table 2 shows the top 30 keywords based on the interactive discourse frequency of interest-related community from the perspective of tourists: tourism, Your Name, life, love, friends, animation, source, experience, photo, high score, interaction, onsite visit, anime pilgrimage, touch, shooting location, microblog, super topics, communication, fans, directors, cure, trend, position, diversify[1], Guangdong, integration, industrial transformation, real-time, and track. The characteristics of the keywords were as follows: the high-frequency words extracted in this study are mainly nouns, and a small number of them are verbs and adjectives. Based on this, the high-frequency words in Tables 1, 2 were effectively analyzed.

Overall, the keywords of the interest-related community interaction from the perspective of the tourist destination hosts are mainly related to the characteristic values of the tourist destination, such as animation world, industry, resource, culture, city, beautiful scenery, art, music, hotel, restaurant, Tokyo, brand, team, Makoto Shinkai, Suga Shrine, and Gifu-ken Gifu, which indicate the existing resources and status of the tourist destination. Besides, the frequency of words such as China and travel is high, indicating that China is a huge tourism demand market; verbs such as learn and inherit imply that the tourist destination needs to explore and learn the development of film and television tourism models; and adjectives such as revivifying, fine, and stunning mainly reflect the tourists' intuitive evaluation of the film and television works and the corresponding tourist destination.

On the other hand, the keywords of interest-related community interaction from the perspective of tourists are also

1 mafengwo.com

TABLE 1 Interest-related community interaction based on tourism hosts (top 30).

Serial number	Keywords	Frequency	Part of speech
1	Animation world	19,870	Noun
2	Revivifying	8,115	Adjective
3	China	7,739	Noun
4	Industry	7,140	Noun
5	Resource	7,140	Noun
6	Travel	7,140	Noun
7	Culture	6,383	Noun
8	City	5,187	Noun
9	Scene	4,573	Noun
10	Beautiful scenery	4,312	Noun
11	Search	4,234	Verb
12	Art	4,234	Noun
13	Music	4,223	Noun
14	Guidance	4,003	Noun
15	Animation	3,652	Noun
16	Hotel	3,609	Noun
17	Fine	3,164	Adjective
18	Restaurant	3,080	Noun
19	Tokyo	2,958	Noun
20	Learn	2,764	Verb
21	Inherit	2,473	Verb
22	Brand	2,458	Noun
23	Team	2,347	Noun
24	Makoto Shinkai	1837	Noun
25	Suga Shrine	1786	Noun
26	Gifu-ken	1,453	Noun
27	Stunning	650	Adjective
28	Breakthrough	607	Verb
29	Animism	464	Noun
30	Traverse	431	Verb

TABLE 2 Interest-related community interaction based on tourists (top 30).

Serial number	Keywords	Frequency	Part of speech
1	Tourism	19,824	Noun
2	Your Name	19,819	Noun
3	Life	9,544	Noun
4	Love	7,933	Verb
5	Friends	7,193	Noun
6	Animation	5,154	Noun
7	Source	4,234	Noun
8	Experience	4,067	Verb
9	Photo	4,025	Noun
10	High score	3,823	Noun
11	Interaction	3,586	Noun
12	Onsite visit	3,437	Verb
13	Anime pilgrimage	3,392	Noun
14	Touch	2,984	Verb
15	Shooting location	2,905	Noun
16	Microblog	2,848	Noun
17	Super topics	2,764	Noun
18	Communication	2,764	Noun
19	Fans	2,707	Noun
20	Directors	2,676	Noun
21	Cure	2,479	Verb
22	Trend	2,206	Noun
23	Position	1875	Noun
24	Diversify	1,404	Verb
25	Mafengwo.com	1,374	Noun
26	Guangdong	790	Noun
27	Integration	778	Noun
28	Industrial transformation	640	Noun
29	Real time	607	Adjective
30	Track	454	Noun

mainly nouns, but the numbers of verbs and adjectives are significantly increased compared with the keywords of interest-related community interaction from the perspective of the tourist destination hosts. It is observed that the keywords from the perspective of tourists mainly focus on sharing the meaning of interactive communication, such as interaction, onsite visit, microblog, super topics, fans, friends, photo, reflecting the communication and sharing form of tourists after the tour; Moreover, the high-frequency keywords were also related to the film content, such as your name, animation, source, high score, shooting location, directors, indicating the close relationship between film and television works and tourism destinations, and reflecting that films are an effective tool to enhance the awareness of tourism destinations. Verbs such as touch and cure are suggestive of the emotional feelings that the film gives people, stimulate and drive the tourists' attention and expectation of tourism destinations. In addition, words such as tourism, anime pilgrimage, and mafengwo.com are indicative of the tourists' real concern about tourism destinations.

4.2. Element category analysis

Through the two-way analysis from the perspectives of the tourist destination hosts and tourists, and in accordance with the rules of Grounded Theory, this study first conceptualized the top 30 high-frequency words in terms of the interactive discourse frequency of interest-related community from the perspective of the tourist destination hosts and the top 30 high-frequency words in terms of the interactive discourse frequency of interest-related community from the perspective of tourists to generate the core generic categories, and the generic analysis was carried out through the three-tier coding process (open coding, relational coding, and core coding). The former was finally classified into seven secondary subcategories, which were animation attraction, cultural expression, industrial form, geographical elements, characteristics of the starting place, tourism experience and demand stimulation, and three core categories, which were tourism hotspots, tourism resources and experience demand, as shown in Table 3. The latter was classified into seven secondary subcategories, animation elements, emotional infection, life elements, environmental elements, tourism experience, destination development, and interactive communication, and three core categories, sightseeing expectation, tourism evaluation and information dissemination, as shown in Table 4.

Given the above analysis of high-frequency words and element categories, the development of film and television tourism should pay more attention to the construction and development of the value chain of the film and television tourism industry from the perspective of the tourist destination hosts. The film and television works are closely related to the shooting locations. When the film and television works show the unique cultural elements of the locations, they will attract social attention and extend the audiences' demand of watching the film to field visit demand, thus stimulating a series of tourist behaviors. For example, the film *Your Name* shows the beautiful scenes of streets, stations, buildings, intersections, mountains, and lakes in Tokyo, Suga Shrine, Gifu-ken, etc., which gives the audience an immersive experience when watching the film and also stimulates the audiences' intention to travel to the location for sightseeing and other experiences. The improvement and development of Internet platforms have also improved the interaction effect between modern film and television works and scenic spots. The online publicity of scenic spots and interactive communication of tourists have built a community of interest for the supply and demand sides. Tourism destinations should constantly improve the settings of scenic spots, improve the service capacity of the destinations, attract more tourists, and improve the economic benefits of tourism destinations. In such a way, a coupling development mode for film and television industry and tourism industry will be achieved.

TABLE 3 Coding of interactive elements of Interest-related community based on tourism hosts.

Level 1 coding (open login)	Level 2 coding (relational Login)	Level 3 coding (core login)
Scene, Makoto Shinkai, Animism, Traverse	Animation attraction	Tourism Hotspots
Art, Music, Animation, Learn, Inherit, Culture	Cultural expression	Tourism resources
Animation world, Industry, Resource, Restaurant, Hotel	Industrial form	
City, Tokyo, Suga Shrine, Gifu-ken	Geographical elements	
China, Travel, Search	Characteristics of the starting place	Experience demand
Beautiful scenery, Stunning, Revivifying, Fine	Tourism experience	
Team, Brand, Guidance, Breakthrough	Demand stimulation	

From the perspective of tourists, the form of "film and television tourism" generated by the interaction between film and television works and tourism destinations can be better spread to attract tourists' attention. As a new form of tourism, film and television tourism has a strong flow aggregation capacity, aiming to transform film and television audiences into destination tourists. For example, *Your Name* won the popularity of consumers after its first release in the cinema. With the further rendering of social media, the number of tourists going to the location will surge, thus forming a new phenomenon of film and television tourism in the new era. When tourists complete their tour of the tourist destination, they will communicate and share their own tour experience and cultural gains through WeChat, microblog, and other personal social media platforms. A new interest-related community will be formed, and information sharing and dissemination in the community will again spread to a wider range of interest-related communities. As a result, interest-related communities gradually come forth from the perspective of the destination tourists, thus realizing cultural enabling and benefit improvement that films can bring forth to tourism destinations.

5. Film interest-related community and tourism interest-related community

5.1. Discussion

Overall, with a focus on the topic of "film-enabling tourism," the current study selected the Japanese animation film *Your Name* for online text analysis and Grounded Theory analysis and explored the film-enabling cultural tourism mechanism based on the interest-related community interaction. According to the research, in the new era of rapid development of the Internet, the emergence and interaction of interest-related community has exerted a positive impact on the sharing of film and television tourism experience and film-enabling tourism and the community effect has been greatly improved. Based on the Grounded Theory

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TABLE 4 Coding of interactive elements of Interest-related community based on tourists.

Level 1 coding (open login)	Level 2 coding (relational login)	Level 3 coding (core login)
Your Name, Animation, High score, Directors	Animation Elements	Sightseeing expectation
Touch, Cure	Emotional infection	
Life, Friends, Photo	Life Elements	
Anime pilgrimage, Shooting location, Mafengwo.com, Guangdong, Real time	Environmental elements	Tourism evaluation
Tourism, Experience, Onsite visit, Love	Tourism experience	
Trend, Position, Diversify, Integration, Industrial transformation, Track	Destination development	
Source, Interaction, Microblog, Super topics, Communication, Fans	Interactive communication	Information dissemination

analysis, the current research generated the film-enabling tourism characteristics from the perspective of the tourist destination hosts and tourists, demonstrating that under different perspectives of destination hosts and tourists, the focuses of the film and television tourism are different. Specifically, from the perspective of the destination hosts, the focus is put on the driving force mechanism of tourist destination development and the construction and development of the value chain of the film and television tourism industry, namely, the stimulation of tourism hotspots, the excavation of tourism resources, the stimulation and satisfaction of experience demand; Whereas from the perspective of tourists, attention is paid to the guidance of the topic flow brought by the interaction between film and television works and tourism destinations based on the interest-related community, namely, the stimulation of viewing expectation, the guidance of tourism evaluation direction and the improvement of information dissemination effect. In view of the above two perspectives, the overall characteristics of the film-enabling tourism mechanisms are concluded.

Based on the above analysis, and in consideration of the geographical location characteristics of the source of interest-related community discourse, it is revealed that most tourists are from Beijing, Shandong, Shanghai, Zhejiang, Guangdong and Sichuan, and the main tourism destinations are Nagano, Tokyo, Izu Islands and Gifu. Based on the characteristics of film-enabling tourism from the perspective of the destination hosts and tourists, this study has proposed six elements of interest-related community interaction of cultural tourism triggered by the film *Your Name*, namely tourism hotspots, tourism resources, tourist experience, sightseeing expectations, tourism evaluation and information dissemination. In such a manner, the current research has directed the pathway of cultural tourism enabled by the Japanese film *Your Name* based on the interest-related community interaction as shown in Figure 2. Films record the past, describe the present, and bear the future. The innovative development of "film and television works + tourism" is inevitable to promote the development of future cultural tourism with films. It will be a long-term sustainable development path to fully tap the value of film and television works and enable the future development of cultural tourism with film and television industry.

5.2. Theoretical implications

In obtaining the text data with the data crawling software, and adopting the analysis paradigm of Grounded Theory, this study has explored the film-enabling tourism mechanism based on the interest-related community interaction, analyzed the elements of the interest-related community interaction, and put forward relevant measures and suggestions. The current research has broken the limitations of previous studies based on tourism motivation and marketing perspective, innovatively introduced the concept of "interest-related community" into the research of film-enabling cultural tourism, and expanded the research perspective of film-enabling cultural tourism exploration. Previous studies discussed primarily the cultural tourism model of tourism destinations from the perspective of tourism destinations (Kim and Park, 2022, pp. 1–5; Chen, 2018, pp. 1–14) or the tourist experience (Teng, 2021, pp. 2588–2601; Teng and Chen, 2020), and rarely explored the development model of cultural tourism from the perspective of film-enabling. From the perspective of tourist destination hosts and tourists, based on the perspective of interest-related community interaction, this study has proposed six elements of interest-related community interaction, expanded the research of interest-related community in the field of film culture tourism, broadened the research perspective of interest-related community and provided a novel perspective for the future research and exploration of cultural tourism.

5.3. Managerial implications

This study provides important practical value for the creation of film and television works and image building of tourism destinations in the future. First of all, film-enabling cultural tourism itself is an innovative application of tourism resources, and it inspires us to strengthen the in-depth interaction between film and tourism in the future, tap into the "element resources" in film and television works, highlight the profound cultural heritage of local tourism resources in film and television works, fully use the Internet media platforms to display unique tourism culture, and create the advantages and characteristics of tourism brands, not only to attract tourists to watch films, but also to drive their strong desire to travel to the shooting locations. Moreover, it should be noted that the

FIGURE 2
Cultural empowerment tourism of *Your Name*: based on interest-related community.

construction of interest-related community is the key to promoting film-enabling cultural tourism. Therefore, it is necessary to actively build interest-related community, make use of the universality of the community to further promote the film-enabling effect to cultural tourism, and achieve a significant increase in the number of film and television audiences and tourists in the interaction between the film interest-related community and tourism interest-related community. Additionally, it is also inevitable to make full use of tourism destination resources and regional resources to realize the flexible allocation, combination and expansion of tourism resources combined with film elements, open up all-round interaction mechanism between film and tourism industrial chain, and provide tourists with the whole process, full time and space experience to comprehensively cater to tourists' demand for all-round experience and achieve innovative development.

5.4. Limitation and future research directions

This study still has deficiencies that need further exploration and improvement. For instance, the data collected are from social media platforms in the Chinese context, and the interest-related communities formed are mainly the audiences of the film *Your Name* and the Chinese tourists traveling to Japan, however, interest-related communities formed by tourists and local residents during the tourism process are not considered. Therefore, future research can attempt to collect data texts including local residents from international social media platforms to further analyze the discourse structure of interest-related communities formed by tourists and local residents to reflect the characteristics of a more comprehensive film-enabling cultural tourism mechanism. In addition, the latest studies in marketing encourage using multiple data sources and methodologies (Li et al., 2021; Wang et al., 2022; Zhou et al., 2023), therefore, quantitative analysis and qualitative analysis can be combined in future research to further explore the influencing factors of film-enabling cultural tourism through model construction and hypothesis verification and further analyze the influence relationship between the elements to provide objective and effective suggestions for film and television works creation and tourism destination development.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material; further inquiries can be directed to the corresponding author.

Author contributions

YL contributed to the empirical work, the writing of the first draft, and the analysis of the results and supported the total work. JZ contributed to the revision and development of the research framework. JL contributed to the overall quality and supervision of the literature organization and empirical work. Authors discussed the results and commented on the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Exploring the mechanism of consumer purchase intention in a traditional culture based on the theory of planned behavior

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There has been a growing interest among scholars and practitioners in cultural empowerment due to the importance of this subject. In this study, we aim to explore the connection between traditional cultural symbols and cultural identity, further estimating how two variables stimulate consumers' emotional value to generate consumers' purchase intention. Based on existing traditional cultural literature and the theory of planned behavior (TPB), we first proposed a research framework and then empirically tested the relationship among traditional culture symbols, cultural identity, emotional value, and consumers' purchase intention. The survey data was tested using structural equation modeling (SEM) and the following conclusions were drawn. First, the cognition of traditional cultural symbols and cultural identity has a direct and significant impact on the emotional value thereby, eliciting consumers' purchase intention. Second, traditional cultural symbols are directly and indirectly (i.e., through emotional value or cultural identity) positively associated with consumers' purchase intention, also cultural identity is directly and indirectly (i.e., through emotional value) associated with consumer purchase intention. Finally, emotional values mediate the indirect effect of traditional culture and cultural identity on purchase intention, and cultural identity plays a moderating role between traditional cultural symbols and consumers' purchase intention. Our findings help to expand the existing literature on consumer purchase intentions by rationally using traditional cultural symbols in the product design and suggesting relevant marketing strategies. The research results can provide valuable inspiration for promoting the sustainable development of the national tidal market and repeating consumers' purchasing intentions.

KEYWORDS

national tide market, traditional cultural symbols, structural equation modeling, cultural identity, emotional value

Introduction

In recent years, the term "National Tide" has represented the rise of local trends in China. For example, in the last decade from 2011 to 2021, the search interest for "National Tide" increased by 528%. In 2020, nearly 80% of consumers tend to choose Chinese national brands, and "National Tide" has become an important consumer cultural phenomenon. Among all the existing Chinese national brands, Li Ning is the first well-known sports brand in China, and launched the "China Li Ning" fashion sports series in 2018. The brand of Li Ning targets young consumers, and the collection combined traditional Chinese culture with fashion trends, reversing the existential crisis that has affected the company since 2010. A brand is the carrier of "National Tide," with traditional culture at the core.

Driven by the trends of modernization and globalization, people are no longer monocultural but rather bicultural or multicultural (Hu et al., 2018). It is established that individual consumption and living habits are influenced by traditional culture and modern culture at the same time. However, traditional culture is the foundation of a country, and self-confidence in a national culture represents an individual's full affirmation and active practice of the national cultural values (Zlata, 2013; Liu, 2016) and firm confidence in its cultural vitality (Pan et al., 2021). This study comprehensively identified the influence mechanism of traditional culture on purchase intention from the perspective of the theory of planned behavior (TPB).

Shimp and Sharma (1987) introduced the concept of ethnocentrism into consumer behavior research for the first time in the context of economic globalization, and proposed the concept of "consumer ethnocentrism tendency (CET)." They believe that when consumers are faced with the choice of domestic products and foreign products, they will have a preference for domestic products and prejudice against foreign products. This tendency is most pronounced when the group to which they belong is threatened by externally. In addition, Zhou et al. (2010), Wang and Hu (2011) put forward "Chinese National Brand Awareness" for the study of Chinese domestic brands' purchase intention. These studies mainly focused on the impact of consumer ethnocentrism tendency, economic anxiety, patriotic feelings, and community identity on purchase intentions. However, with the modernization of the economy, globalization, and the networking of cultures, the cultural environment in which individuals live has become more complex and diverse. So, how do cultural symbols affect purchase intention in the consumption behavior of "National Tide" products? How one attitude toward traditional culture affects one's willingness to purchase "National Tide" products, it is still unknown in the literature.

Our review of the literature revealed various open research gaps. First, prior research on the influence of traditional culture on consumers' purchase intention is mainly focused on qualitative research designs. Second, there is a lack of measurement scales for traditional cultural identity, and the understanding of the status of traditional cultural identity is only at the empirical and conceptual level. Third, most of the existing research on the influence of traditional culture on consumers' purchase intention is based on "consumer ethnocentrism tendency."

Based on the evaluation system of cultural identity, referring to the three stages of cultural identity development proposed by Phinney (1993), this paper divides traditional cultural identity into the cognition of traditional cultural symbols, the confirmation of cultural Identity, and the emotional value of traditional culture. This research adopts a combination of qualitative and quantitative research methods to construct a model of the traditional cultural symbols, cultural identity, emotional value, and consumers' purchase intention, exploring the mechanism of traditional culture on consumers' purchase intention. The research results can explain the consumption behavior of national fashion brands and provide enterprises with suggestions and marketing strategies. The rest of this paper is organized as follows: Section "Literature review and hypotheses development" provides a review of the relevant literature. In this section, hypotheses are formulated and the research model is established. Section "Methodology" presents the research methodology, including the questionnaires and data collection involved, and presents the results of the data analysis. Section "Data analysis and hypothesis testing" discusses the findings. Finally, Sections "Discussion and implication" and "Implications" discuss the contributions, theoretical and managerial implications, as well as study limitations and prospects for future research.

Literature review and hypotheses development

Traditional culture and cultural identity

Identity includes attribution identity, regional identity, economic identity, cultural identity, political identity, social identity, and national identity (Samuel, 2005). Cultural identity is defined as a "broad range of beliefs and behaviors that one shares with members of one's community" (Jensen, 2003). Sociologists analyze culture as a system, and discuss the role of culture in creating personal activities, such as the cultural symbols used, the cultural ideas followed, the thinking patterns and behavioral norms (Ann, 1986).

Earlier, Mol divided cultural identity into two dimensions (Powell, 2017). One is to focus on the social dimension. For example, according to Phinney's definition (1989), cultural identity is an individual's sense of belonging and psychological commitment to a particular country or nation. Meanwhile, Phinney (1993) divides the development of cultural identity into three stages: unexamined cultural identity, exploration of cultural identity, and achievement of cultural identity. In the unexamined cultural stage, individuals take their own cultural identity for granted, lack awareness of cultural differences, and show little interest in cultural issues. The sense of belonging to one's group is mainly influenced by factors such as parents, groups, mass media, etc. It is easy to accept and internalize the stereotypes generally held about one's own group without question. The cultural identity stage is the process of exploring and reflecting on one's culture, gaining more understanding of one's own culture, and beginning to understand the meaning of one's own group identity. This stage is achieved by increasing dialog on cultural issues, reading relevant materials, and participating in cultural activities. At this point, cultural members inject more emotional components into the cultural group, especially when they are antagonistic to other groups. The cultural identity achievement stage is the clear and confident acceptance of the culture, and the cultural identity is internalized into self-awareness. At this stage, people can properly deal with stereotypes and discrimination, enhance cultural confidence, and a positive psychological adaptation (Myron and Jolene, 2010). The other is to focus on the personal dimension of cultural identity, emphasizing "cultural identity." Erikson (1968) believes that cultural identity refers to the social psychological process by which individuals internalize their own culture and cultural groups and generate a sense of belonging to acquire, maintain and innovate their own culture.

Whether from the social dimension or the individual dimension, cultural identity is not innate and is created in the process of human socialization. Phinney (1991), after reviewing the research on ethnic identity, pointed out that strong mainstream identity is only related to high self-esteem when there is a positive adaptation to mainstream culture. Hirai (2016) pointed out that traditional culture in a macro sense indicates all human activities such as religion, philosophy, moral standards, laws, politics, economics, society, history, literature, and art that have been preserved, learned, and transmitted in each community or group over a long period.

Culture includes traditional culture, but it is not completely consistent. However, there are few related studies on traditional cultural identity. Concepts like traditional cultural identity include "ethnocentrism" (Sumner, 2016), "ethnic consciousness," and "national community identity" (Zhou et al., 2010), etc. For the evaluation of cultural identity, many studies have designed and developed corresponding measurement tools based on the theory of group and social identity. Phinney (1992) developed MEIM (Multigroup Ethnic Identity Measure), which includes three parts: Affirmation and Belonging, Ethnic Identity Achievement, and Ethnic Behaviors. In the study of Phinney and Ong in 2007, MEIM-R (Multigroup Ethnic Identity Measure-Revised) scale was refined, and only six items were used to measure cultural identity from two dimensions: Exploration and Commitment. In addition, Wang and Hu (2011) divided cultural identity into three dimensions: cultural symbol identity, cultural identity, and cultural value identity. Cultural symbol identity measures the attitude tendency of individuals toward ideographic symbols such as material forms, language, and life matters in different cultural backgrounds; cultural identity is to measure people's attitude, evaluation, belonging tendency, and emotional attachment to different cultural groups; and cultural value identity examines the degree of individual acceptance of social norms and cultural value of specific cultural groups in terms of self-awareness (Wang and Hu, 2011). Based on the evaluation system of cultural identity, referring to the three stages of cultural identity development proposed by Phinney (1993), this paper divides traditional cultural identity into the cognition of traditional cultural symbols, the confirmation of cultural Identity, and the emotional value of traditional culture.

Traditional cultural symbols

Cultural symbols include both linguistic symbols and non-linguistic symbols (Rosendaal and Reitsma, 2017). It is the carrier of culture and plays an important role in cultural creation, cultural significance transmission, and inheritance. Culture-based research is characteristic of modern semiotics (Michael and Mark, 1996) and other fields of study such as folklore analysis, anthropology, narratology, disclosure analysis, and art semiotics (Greimas, 2002). Symbols have two main functions: covering "Signification" (Peirce) and "Expression" (Saussure) (Atkin, 2022). As far as cultural symbols are concerned, they are the core meaning system for cultural inner groups to achieve cultural identity, and also the representation system for other cultural groups to identify and communicate with a cultural system (Dwight, 2014; Gong et al., 2020a).

Traditional cultural symbols are the carrier of traditional culture, which can intuitively express national characteristics and national styles, and are the external manifestations of various ideological cultures and ideologies in national history. From the cultural level, traditional cultural elements can be divided into three levels: first, the external "tangible" level representing the physical elements of cultural product design, such as color, outline, texture, heraldic decoration, etc.; second, the medium level include "behavioral" elements with operational characteristics such as functionality and craftsmanship; finally, third inner level represents the "intangible," which includes intangible psycho-cultural elements such as those with special meaning, a sense of story, and a sense of emotion (Benny and Hazel, 2003).

Chinese traditional cultural symbols are based on thousands of years of historical and cultural ideas and integrate the cultural characteristics of various ethnic groups and regions. Traditional cultural symbols can be divided into explicit symbols and invisible symbols. The explicit symbols include Chinese characters, Chinese calligraphy, the Forbidden City, the Great Wall, Suzhou Gardens, Terracotta Warriors and Horses, Silk, Porcelain, Peking Opera, Shaolin Temple, Kung Fu, and so on. Invisible symbols such as Yin-Yang, Taoism, Confucianism, Zen Buddhism, and so on, are the spiritual connotation implied in various tangible symbols. For example, in calligraphy art, from pen and ink color to structure composition, symbols embody the principle of balance between Yin and Yang. The shade of ink color is a kind of yin and yang: indifference is yang while thick ink tastes yin, and dry ink is yang while moist ink is yin. In terms of composition, it is not only the arrangement of Chinese characters but also the blank space between words and lines that make the whole work balance yin and yang and have a sense of rhythm. No matter what traditional cultural symbols are involved, they all reflect the Chinese people's outlook on life, values, ethics, customs, cultural education, and the wisdom and philosophy of the Chinese nation. It can be said that traditional culture subtly affects the life of modern people, providing a steady stream of elements and inspiration for product design. In particular, future design needs to return to the perspective of humanities and esthetics, and technology cannot be used as a simple auxiliary tool to guide design (Shi et al., 2021).

According to different types of traditional cultural symbols, the application of product design can usually be divided into two segmentations: one is the representational transformation of symbols, while the other is the abstract transformation of symbols (Gong et al., 2020b; Fang et al., 2021). Representational transformation refers to the direct extraction and transformation of tangible traditional cultural symbols, and their application to product design; for example, cultural and creative products in museums directly apply traditional cultural elements such as images, colors, and lines to daily necessities, showing Chinese esthetics in the overall style. Abstract transformation refers to the transformation of intangible traditional cultural symbols and the application of abstract ideology in product design concepts. The design concept of "tracking," "realizing" and "walking" clothing and footwear series launched by China Li Ning originated from the wisdom and thinking of traditional Chinese culture. The application of traditional cultural symbols in product design can stimulate patriotic pride in consumers' hearts and satisfy cultural needs and a sense of belonging. In the field of consumption, the application of cultural symbols can easily stimulate consumers' cultural identity, which in turn triggers purchase intentions.

The influence of traditional culture in purchase intention

Purchase intention is rooted in consumer psychology, and reflects the subjective probability that consumers are willing to take a specific purchase behavior (Li et al., 2021; Zhou et al., 2023). Mullet and Karson (1985) believed that consumers' attitudes toward a certain product or brand, combined with the effect of external factors, constitute consumers' purchase intention, which can be regarded as the subjective tendency of consumers to choose a specific product. It has also been shown to be an important predictor of consumer behavior (Blackwell et al., 2018).

The Theory of Planned Behavior (TPB; Ajzen, 1991) is considered the most famous theory of attitude-behavior relationship in social psychology. It has been widely used in many behavioral fields and has been proven to significantly improve the predictive and explanatory power of behavioral research. TPB purports that the combination of three core components including attitude, subjective norms, and perceived behavioral control shapes an individual's behavioral intentions. And put forward the basic hypothesis of the behavior intention model, that is, the more positive an individual's attitude toward a certain behavior, the stronger his behavior intention; and the more positive the subjective norm of a certain behavior is, the stronger the individual's behavioral intentions will be stronger. When the attitude and subjective norms are more positive and the perceived behavior control is stronger, the individual's behavioral intention will also be stronger. The TPB has indicated the change in consumers' attitudes is the main inducement of the change in consumers' behavior.

The prediction of consumer behavior is directly related to the sales of products and the decision-making of the company (Jeong and Jin, 2020). Hence, planning behavior is an important research issue in consumption behavior, as well as a major concern of marketing researchers. In addition to consumer attitudes, consumer identity is also closely related to consumer behavior (Mullet and Karson, 1985). As the anthropologist Friedman (2012) pointed out the consumption in the world system is always the consumption of identity. The sociology of consumption holds that identity includes not only the action side, which is related to the paradigm of "consumption behavior," but also the culture and symbol side, which is related to the paradigm of "cultural consumption" (Rössel et al., 2017). Individual identity and consumption behavior are two aspects of the same process. Personal consumption behavior is not only a reflection of disposable money and resources but also a reflection of personal identification of certain symbols or values. Therefore, consumption activity is a special and important identity behavior. Cultural identity and belonging are affirmed through lifestyles, which are in turn expressed through product conversations and manifestations of related consumer behaviors (Grant, 1986; Søren et al., 2005; Cao et al., 2018; Bodhi et al., 2022). This social interpretation of products is consistent with the theory of planned behavior (Ajzen, 1985).

In consumption behavior, the three original constructs of individual attitude, subjective norm, and perceived behavioral control in TPB are not sufficient to explain the consumers' purchasing behaviors. Simonson (1992) further expanded the original construction of TPB to include cultural identity, moral norms, emotional values, etc. As mentioned above, the application of traditional cultural symbols in product design not only endows products with unique cultural quality but also increases consumers' emotional resonance and cultural identity. For example, Shimp and Sharma (1987) pointed out that when consumers are faced with the choice of domestic and foreign products, they will have a preference for domestic brands and prejudice against foreign products, and this tendency is most prominent when their group is threatened externally.

Based on CET (Consumer Ethnocentrism Tendency), Zhou et al. (2010) point out that the consciousness of domestic products is formed under the influence of three factors: national economic hardship consciousness, national patriotic emotion, and national community identity. From the perspective of the national brand community, "Chinese National-brand Consciousness" can be regarded as a phenomenon where the members of a national community have a sense of responsibility for the brands because of their identity as a community, thus generating a supportive awareness of national brands. Nationalism, namely community identity, and patriotic feelings have a positive impact on the consumers' purchase intention. Grounded on the above findings, this study learns from Shimp and Sharma's "Consumer Ethnocentrism Tendency" and "Chinese National-brand Consciousness" model, and proposes the following hypotheses from the perspective of traditional cultural identity:

> *H1*: The degree of cognition of traditional cultural symbols has a positive impact on cultural identity.
>
> *H2*: The degree of cognition of traditional cultural symbols has a positive impact on the emotional value of traditional culture.
>
> *H3*: The stronger consumers' cognition of traditional cultural symbols, the. stronger consumers' purchase intention of national tide brands.
>
> *H4*: The degree of cultural identity has a positive impact on the emotional value of traditional culture.
>
> *H5*: The stronger the cultural identity of consumers, the stronger the purchase intention of national tide brands.
>
> *H6*: The stronger the emotional value of the traditional culture of consumers, the stronger the purchase intention of national tide brands.
>
> *H7*: Consumers' emotional value identification of traditional culture has a mediating effect on the purchase intention of national tide brands.
>
> *H8*: Consumers' cultural identification of traditional culture has a mediating effect on the purchase intention of national tide brands.

Based on the above assumptions, combined with the cultural identity theory, and related research on TPB behavioral intentions, we can construct a conceptual model, as shown in Figure 1. This model explains the internal relationship between consumers' traditional cultural identity and consumers' behavioral intentions. Intention to purchase, with the consumers' emotional value as a mediator.

Methodology

Procedures and sample

The brand of Li Ning was selected for the study because it was the first Chinese sports brand and debuted its "National Tide" line "China Li Ning" in 2018. Targeting young consumer groups, the collection combines Chinese traditional culture and elements with fashion trends and reversed the survival crisis affecting the company since 2010. By upgrading its product and brands, Li Ning achieved a revenue of 22,572 billion yuan in 2021 under the COVID-19 epidemic, a year-on-year increase in gross profit of ~68.7%. The success of Li Ning is a typical example of the influence of traditional culture on consumers' purchase intention. A questionnaire targeting Li-Ning's consumer behavior is highly representative.

Before formally distributing the questionnaire, 50 students were first selected in the university for a pilot study (e.g., Luqman and Zhang, 2022; Luqman et al., 2022), and the test items whose analysis resulted in <0.5 or higher than 0.5 at the same time were deleted, while the test items that were not expressed clearly and accurately were repeatedly adjusted, and finally, 25 test items were left as the official scale. After the pre-test stage, questionnaires were widely distributed on online communication platforms such as WeChat and QQ. Four hundred and thirty-one questionnaires were collected within 3 days. After screening out some questionnaires with short response times, similar test items but large differences in answers, and multiple repetitions of the same response. Four hundred and five valid questionnaires were finally collected, with an efficiency rate of 93.97%, and the sample data statistics are shown in Table 1.

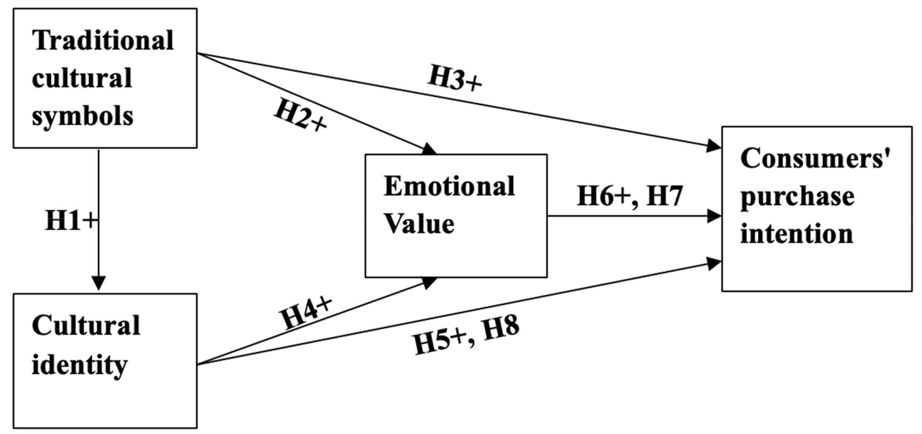

FIGURE 1
Conceptual model of traditional culture on purchase intention.

Descriptive statistical analysis showed that among all respondents, most of the respondents were female (284), accounting for 70.12% of the total respondents, while the number of males was 121, accounting for 29.88% of the total respondents. The overall age of the respondents was relatively young, with 81.97% of the respondents being under 30 years old. Among the occupations, the majority were students, with 204 respondents (50.37%). Most of the respondents had a bachelor's degree or above (378, accounting for 93.33%), among which 184 (45.43%) had a bachelor's degree; 164 (40.49%) had a master's degree, and 30 people (7.41%) with doctor's degree. In terms of personal marital status and income, the respondents were mostly unmarried, with 341 people (84.20%), and the income level was mostly below 50,000, with 212 people (52.35%).

Scale design

This study explored the customers' traditional cultural identity and purchase intention of "National Tide" brands. A literature scale was designed for this investigation based on the MEIM scale developed by Phinney (1992) in his study (see Table 2). The first part is the measurement of consumers' awareness of traditional cultural symbols. The second part measured the consumers' emotional attitudes toward traditional culture such as 'belonging' and pride that was based on the scale of the research of Wang (2011) and Zhou et al. (2010). The third part is the measurement of consumers' purchase intention. Extending previous studies, a questionnaire was designed to grasp the characteristics of the respondents (Luqman et al., 2020b). All the items were measured using a 5-point Likert scale (from "strongly disagree = 1" to "strongly agree = 5"), and the respondents answered according to their actual experiences.

Data analysis and hypothesis testing

Theoretical model and empirical analysis

In this study, SPSS 27.0.1 and AMOS 26 were used to test the correlation of the scales. SPSS 27.0.1 was used to illustrate the population characteristics of the sample and its reliability (Cronbach's alpha) through descriptive analysis, and AMOS 26 was used to verify the validity of each factor. With gender, age, education level, occupation, annual income level, marriage, and place of residence as control variables, the proposed hypothesis was tested using a structural equation model (SEM) to avoid possible multicollinearity among independent variables (e.g., Luqman et al., 2020a, 2021).

Reliability and validity test

The data analysis of Table 3 shows that the questionnaire has good reliability. The Cronbach's alpha values of each scale are above the critical value of 0.07, and the total reliability of the questionnaire is 0.908. Meanwhile, the convergence of the scale was evaluated using the variable correlation coefficient analysis, and the results showed that the CITC values of the analyzed items were all above 0.7, indicating a good correlation between the analyzed items, as well as good reliability. The standardized factor loadings for all measured elements ranged from 0.755 to 0.854, higher than 0.6; therefore, all elements were statistically significant. Table 3 also shows the average variables extracted (AVE) values ranged between 0.608 and 0.651; indicating good validity (Fornell and Larcker, 1981). The square root of the AVE of the latent variables was generally >0.5 (Table 4). At this point, the next step of the analysis can be performed (e.g., Masood et al., 2020, 2022).

Hypothesis testing

Before testing hypotheses, the model fit was tested by using AMOS 26 (Figure 2), and the detailed results are shown in Table 5. The χ^2/df value is between 2 and 3, indicating the validity of the model. The root means square error of approximation (RMSEA) is equal to 0.018; <0.05, the modeling is considered to fit well. IFI (Incremental Fit Index) is 0.954, TLI (Tucker-Lewis Index), CFI (Comparative Fit Index), and GFI (Goodness of a Fit Index) is around 0.9. The results are within the acceptable range of fit indicators but not to the absolute fit, because of slightly lower values compared to good model fit (Michael and Robert, 1992; Jöreskog and Sörbom, 2002; Hair et al., 2009).

Table 6 presents the result of testing the proposed hypothesis using SEM. The finding of this survey suggested a positive relationship among traditional culture symbols, cultural identity, emotional value, and

TABLE 1 Subject's demographic and usage behavior.

Measure	Item	Frequency	%
Gender	Male	121	29.88
	Female	284	70.12
Age	10–19	22	5.43
	20–29	310	76.54
	30–39	50	12.35
	40–49	13	3.21
	50–59	10	2.47
Occupation	Government staff/ Government cadres/civil servant	11	2.72
	Corporate managers (including junior and middle and senior managers)	28	6.91
	Corporate staff	68	16.79
	Professionals (doctor/lawyer/ journalist/teacher, etc.)	56	13.83
	Self-employed	7	1.73
	Freelance/ Temporary Work	22	5.43
	Current students	204	50.37
	Other (housewives, retired, unemployed, etc.)	9	2.22
Education	High School/ Vocational High School	6	1.48
	Junior college	21	5.19
	University	184	45.43
	Master	164	40.49
	PhD	30	7.41
Annual income	Below ¥50,000	212	52.35
	¥50,001–¥100,000	70	17.28
	¥100,001–¥200,000	69	17.04
	¥200,001–¥300,000	26	6.42
	Above ¥300,000	28	6.91
Marital status	Unmarried	341	84.20
	Married	59	14.57
	Divorced	5	1.23

Valid $n = 405$.

consumers' purchase intention. The estimate of all hypotheses ranged from 0.198 to 0.578, higher than 0, and the critical ratio (CR) is between 3.937 and 9.205, higher than 2. Meanwhile, the *p*-value of all hypotheses is <0.001, indicating that traditional cultural symbols have a direct impact on cultural identity, emotional value, and consumers' purchase intention. Cultural identity has a direct effect on emotional value, and consumers' purchase intention. Emotional value has a direct impact on consumers' purchase intention. Hypotheses H1, H2, H3, H4, H5, and H6 were supported for this study.

Mediating effects

To further explore the influence of emotional values on consumers' purchase intentions, this study used the bootstrap test proposed by Preacher and Hayes (2008), with 2000 sampling times, to verify the existence of the mediation effect, which can be considered significant if the 95% confidence interval does not contain 0 (Zhao et al., 2010). This study used traditional cultural symbols and cultural identity as the independent variable, used the consumers' purchase intention as the dependent variable, and used cultural identity as the mediator. The results are shown in Table 7. When the emotional value is the mediator variable, traditional cultural symbols are the independent variable, the direct effect is significant (95% confidence interval: 0.102, 0.313), and the mediating effect is significant (95% confidence interval: 0.05, 0.164) with a percentage of mediating effect of 18.18%. It indicates that emotional value plays a partly intermediate role between traditional cultural symbols and consumers' purchase intention. When the emotional value is the mediator variable, cultural identity is the independent variable, the result indicating that the direct effect of cultural identity on consumers' purchase intention is significant (95% confidence interval: 0.23, 0.473), and the mediation effect is also significant (95% confidence interval: 0.028, 0.115). This indicates that emotional value plays a partly intermediate role between cultural identity and consumers' purchase intention. H7 is statistically supported. When cultural identity is the mediator variable, the traditional cultural symbols are the independent variable, the direct effect is significant (95% confidence interval: 0.102, 0.313), and the mediating effect is significant (95% confidence interval: 0.124, 0.301) with a percentage of mediating effect of 38%. H8 is statistically supported. This suggested that cultural identity also plays a partly intermediate role between traditional cultural symbols and consumers' purchase intention. With the support of Preacher and Kelley (2011), we can suggest that in this study, emotional value plays a relatively small mediating role between cultural identity and consumers' purchase intention. While the mediating effect of cultural identity on traditional cultural symbols and consumers' purchase intention is relatively great.

In summary, a model of the mechanism of the influence of traditional culture on consumers' purchase intention can be obtained, the details were shown in the Figure 3.

Discussion

Research conclusion

This study aims to explore the influence mechanism of traditional culture on the consumption willingness of the "National tide" from the perspective of traditional cultural identity. Specifically, we examined the association between two independent variables, traditional cultural symbols and cultural identity, and their association with emotional identity. Finally, we examine direct and indirect associations of emotional identity and cultural identity with consumers' purchase intention. In the process, we combined cultural identity theory and the

TABLE 2 Measurement items.

Dimension	No.	Description
Traditional cultural symbols	TCS1	I have knowledge of traditional cultural symbols (elements)
	TCS2	Traditional cultural symbols (elements) are attractive to me (including Chinese characters, Confucius, calligraphy, the Great Wall, Chinese medicine, the Forbidden City, the Terracotta Warriors, etc.)
	TCS3	I know Chinese history culture very well (dynastic changes, historical figures, etc.)
	TCS4	I am very familiar with Chinese philosophical thought (Confucianism, Mohism, Taoism, Legalism, etc.)
	TCS5	I know Chinese language culture very well (Chinese, minority languages, poems and songs, etc.)
	TCS6	I know Chinese art culture very well (calligraphy, painting, music, opera, arts and crafts, etc.)
	TCS7	I know Chinese folklore very well (festivals, customs, weddings and funerals, etc.)
Cultural identity	CI1	I spend a lot of time learning to understand traditional culture (history, philosophy, language, art, folklore, etc.)
	CI2	I did not spend much time to understand my cultural background (physical culture such as food, architecture, etc., and spiritual culture such as language, customs, etc., which influence physical and mental development and personality formation)
	CI3	I am well aware of the influence of traditional culture on my life (clothing, food, housing, transportation, etc.)
	CI4	I spend a lot of time sharing and discussing traditional culture with others
	CI5	I like to spend time learning about other cultures (such as Japanese and Korean, European and American cultures, etc.)
Emotional value	EV1	I identify more with traditional culture than with Western culture
	EV2	I have a strong sense of pride in traditional culture
	EV3	I have a strong sense of belonging to traditional culture
	EV4	I do not want to be friends with people from other cultures
	EV5	I have a positive attitude toward the development of traditional culture
Consumers' purchase intention	CPI1	I am interested in Li Ning products that contain traditional cultural symbols
	CPI2	I am against the combination of traditional culture and fashionable and popular elements in Li Ning products
	CPI3	I am interested in Li Ning products that combine traditional culture and fashionable and popular elements
	CPI4	I have a desire to buy Li Ning products that combine traditional culture with fashionable and popular elements
	CPI5	I think the combination of traditional culture and fashionable elements of Li Ning products have cultural deposits
	CPI6	I think the design of Li Ning products that combine traditional culture and fashionable elements is novel and attractive
	CPI7	I think the combination of traditional culture and fashionable elements of Li Ning products in line with personal esthetics
	CPI8	I think the combination of traditional culture and fashionable elements of Li Ning products in line with the current fashion trends

TPB model, and empirically tested seven hypotheses, drawing the following conclusions: First, the cognition of traditional cultural symbols and cultural identity has a direct and significant impact on the emotional value thereby, eliciting consumers' purchase intention. Our findings support hypotheses H1 and H2, and H3 with $p < 0.05$. This shows that the perceived traditional cultural symbols have a significant positive impact on consumers' traditional cultural identity and emotional values, and on the other hand, it also has a direct impact on the purchase intention, but it is not significant. The stronger consumers' cognition of traditional cultural symbols, the stronger their cultural identity and emotional value. This result is consistent with previous research on symbols and identity. For example, Perach and Limbu (2022) report that masks with cultural symbols can increase positive interpersonal perceptions of people whose symbols represent meaningful social identities during the COVID-19 pandemic. Moreover, it is not only the contemporary cultural symbols that can elicit identification but also identification with traditional cultural symbols in our society (Monge et al., 2021).

Our findings endorsed that traditional cultural symbols are closely related to consumers, their way of thinking, and their willingness to buy. Moreover, the influence of cultural symbols on consumers' purchase intention does not need to be based on cultural identity, which is very common in the purchase of tourist souvenirs. This means that when consumers buy souvenirs, they represent regional cultural characteristics, and their commemorative significance mainly emphasizes the symbolic or cultural meaning given by symbols (Trinh et al., 2014), rather than the identification of a certain regional culture. The authenticity and foreignness of travel commodities play an important role in consumers' purchasing decisions (Li and Katsumata, 2020; Nusrat et al., 2021). Therefore, symbols can directly influence consumers' purchase intention. At the same time, the research results show that emotional value is a subjective, high-level need. The stronger the cognition of traditional cultural symbols, the higher the emotional value, and the emotional value plays a partial mediating role between the cognition of traditional cultural symbols and consumers' purchase intention.

Second, traditional cultural symbols are directly and indirectly (i.e., through emotional value or cultural identity) positively associated with consumers' purchase intention, also cultural identity is directly and indirectly (i.e., through emotional value) associated with consumer

TABLE 3 Factor loading, Cronbach's alpha, CR, and AVE.

Dimension	No.	Factor loading	CITC	Cronbach's alpha	AVE	CR
Traditional cultural symbols	TCS1	0.792	0.749	0.916	0.608	0.916
	TCS2	0.784	0.74			
	TCS3	0.744	0.711			
	TCS4	0.788	0.749			
	TCS5	0.788	0.752			
	TCS6	0.782	0.743			
	TCS7	0.78	0.742			
Cultural identity	CI1	0.793	0.746	0.903	0.651	0.903
	CI2	0.777	0.737			
	CI3	0.799	0.749			
	CI4	0.811	0.76			
	CI5	0.854	0.796			
Emotional value	EV1	0.776	0.722	0.887	0.611	0.887
	EV2	0.777	0.723			
	EV3	0.776	0.721			
	EV4	0.785	0.734			
	EV5	0.792	0.729			
Consumers' purchase intention	CPI1	0.775	0.741	0.926	0.609	0.926
	CPI2	0.79	0.758			
	CPI3	0.794	0.759			
	CPI4	0.755	0.722			
	CPI5	0.779	0.748			
	CPI6	0.759	0.722			
	CPI7	0.788	0.756			
	CPI8	0.8	0.766			

AVE, average variance extracted; CR, composite reliability.

TABLE 4 Discriminant validity.

	Traditional cultural symbols	Cultural identity	Emotional value	Purchase intention
Traditional cultural symbols	**0.780**			
Cultural identity	0.456	**0.807**		
Emotional value	0.509	0.463	**0.781**	
Purchase intention	0.517	0.598	0.532	**0.780**

The data on the diagonal is the square root of AVE.

purchase intention. Finally, emotional values and cultural identity mediate the indirect effect of traditional cultural symbols and cultural identity on purchase intention. Emotional value is the mediating variable between consumers' traditional cultural identity and purchase intention. This conclusion is consistent with the findings of national patriotic sentiment and national community identity and the mediating variables of domestic commodity awareness (Zhou et al., 2010; Liu et al., 2020). Under the influence of deepening the cognition of traditional symbols, the degree of traditional cultural identity is strengthened, thereby enhancing its emotional value. When consumers feel more and more strongly about traditional culture, they will have a better impression of products containing traditional cultural symbols.

Implications

Theoretical implication

The study has three main theoretical contributions. First, our study introduces the influence mechanism of traditional culture on consumers' purchase intention, and explores the influence of traditional culture on consumers' purchase intention from a psychological perspective. Secondly, our research extends the existing limited scale of traditional cultural identity, which not only confirms the relationship between external traditional cultural symbols and people's self-identity, but also enhances emotional value, which is conducive to the inheritance and popularization of

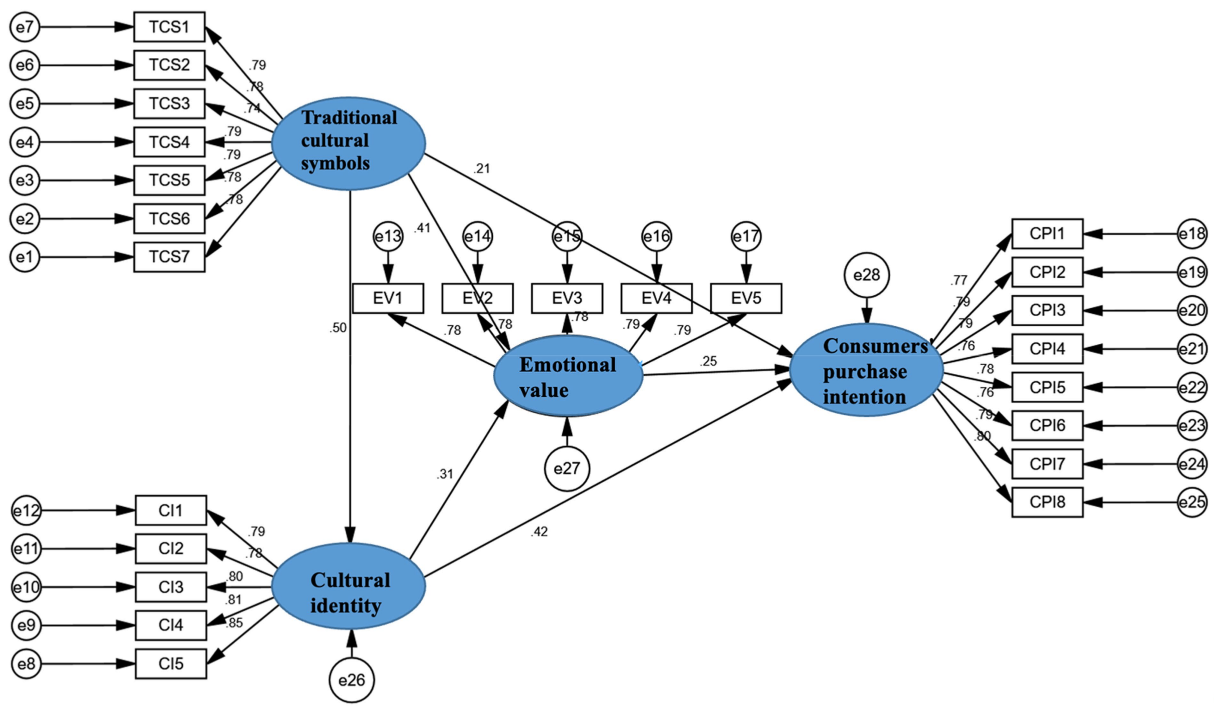

FIGURE 2
The original edition of structural equation modeling.

TABLE 5 Model fit indices.

Factors	χ^2/ df	RMSEA	NFI	IFI	TLI	CFI	GFI
Value	1.136	0.018	0.848	0.954	0.994	0.994	0.945

traditional culture. Third, this study has provided a novel perspective on the development of the national fashion brands. Our research results show that by strengthening the rational transformation of traditional cultural symbols and enhancing the emotional value of consumers, we can stimulate consumers' attitudes toward consumerism and promote the stable development of the "National Tide" market.

Practical implication

This study also makes several important practical contributions. First, our study results have provided a reference index for market optimization to improve the consumers' willingness to purchase "National Tide" products. Designers and market planners of the "National Tide" brand should consider the influence factors of consumers' identification with traditional culture on their purchase intentions.

Secondly, since traditional cultural symbols can directly affect consumers' willingness to buy, designers should reasonably transform traditional cultural symbols into product design. For example, as a visual touch point for consumers, product design is the most important form of expressing the uniqueness of a product. At the same time, it will give consumers the most intuitive first impression (Wu et al., 2022). It is necessary to avoid the problem of product homogeneity caused by the accumulation of traditional cultural symbols and modular patchwork. Organizations should innovate and rationally transform traditions and effectively combine traditional culture with fashion trends, such as Japanese tourist souvenirs and creative cultural products from the Forbidden City. This is the only way the "National Tide" brand can exert the continuous attraction of traditional culture to consumers.

TABLE 6 The regression weights of casual paths.

Hypotheses	Estimates	SE	C.R.	Value of *p*	Results
H1	0.578	0.063	9.205	***	Supported
H2	0.4	0.057	6.984	***	Supported
H3	0.198	0.05	3.937	***	Supported
H4	0.265	0.048	5.556	***	Supported
H5	0.342	0.044	7.736	***	Supported
H6	0.24	0.054	4.477	***	Supported

Third, our findings provide enlightenment for "National Tide" brand marketers to explore the spiritual connotation of traditional cultural symbols and enhance consumers' cognition of the cultural attributes of "National Tide" products. In the reasonable transformation of figurative traditional cultural symbols, our research suggests that the spiritual connotation of non-material traditional cultural symbols should be fully explored, and abstract ideology should be applied to product design concepts to establish a sense of belonging at the level of consumers 'perception. Our research points out that the global reputation of Japanese products

TABLE 7 Test of the potential mediating effects.

Effect category	Effect value	95% confidence interval		Percentage	Conclusion
		Boot CI Lower Bounds	Boot CI Upper Bounds		
Traditional cultural symbols→emotional value→consumers' purchase intention					
Direct effects	0.198	0.102	0.313	18.18%	Partial mediate
Indirect effects	0.096	0.05	0.164		
Total effects	0.528	0.422	0.649		
Cultural identity→emotional value→consumers' purchase intention					
Direct effects	0.342	0.23	0.473	16%	Partial mediate
Indirect effects	0.064	0.028	0.115		
Total effects	0.405	0.288	0.533		
Traditional cultural symbols→cultural identity→consumers' purchase intention					
Direct effects	0.198	0.102	0.313	38%	Partial mediate
Indirect effects	0.198	0.124	0.301		
Total effects	0.528	0.422	0.649		

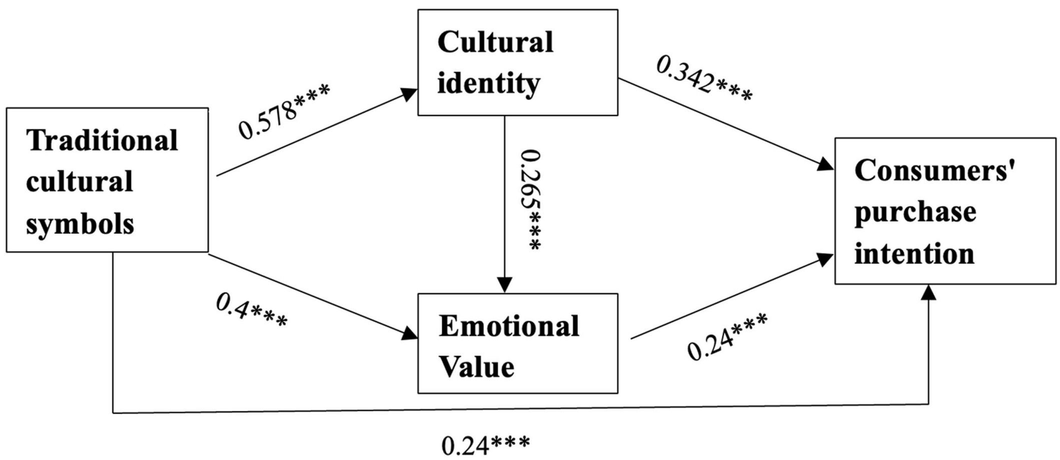

FIGURE 3
The mechanism of traditional culture on purchase responses.

lies not only in their superior quality but also in the spirit of Japanese craftsmanship.

Finally, our findings provide insights that marketers should incorporate into their marketing campaigns. As mentioned in the previous section, simply emphasizing traditional cultural identity in the marketing process is not enough to trigger consumers' purchase intention. The need to enhance their emotional value, i.e., cultural belonging and pride, can effectively influence consumers' purchase intention. Additionally, marketers can use digital marketing to increase consumer engagement. The active role of social media in product sales should be fully leveraged. For example, product design inspiration and ideas should be actively displayed and promoted on social media (Khalid et al., 2021a,b; Saleem et al., 2021). The display of digital social media can better deepen consumers' understanding of the cultural connotation of brands and products, and enhance consumers' traditional cultural identity and emotional value.

Limitations and future directions

This study has the following limitations. First, the current study only examined the problem from the perspective of traditional cultural symbols, identities, emotions, etc., and does not consider other factors that affect the purchase intention of national fashion brands, such as conservatism, cultural adaptation, etc. (Schwartz et al., 2017), cultural openness sex and other relevant pre-existing variables (Shimp and Sharma, 1987; Zhang et al., 2022). Therefore, the generalizability of the study is limited. Future studies can integrate more variables for more systematic studies. Second, more than 80% of the sample in this study was 30 years old or younger. Although it is consistent with the age distribution of the "National Tide" consumer groups of Baidu 2021 National Tide Pride Search Big Data, stated that 74% of the brand consumers in the entire industry are born in the post-90s and post-00s, there may be deviations in the research results. Therefore, more diverse samples are needed to strengthen the findings. Future researchers should expand their sample selection to increase the explanatory power and generalizability of our findings, prevent bias in their sample selection, and improve the overall credibility of the study. In addition, the emotion of traditional culture is a kind of consciousness. As a nonfigurative psychological concept, it should be measured in a more systematic and advanced way than traditional questionnaires. Therefore, a psychological approach to measuring this concept is needed in future research.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

ZZ, HG, and XL contributed to the conceptualization of the study and data collection. ZZ and HG also contributed to writing the first draft of the manuscript. HG and XL ran the analyses and wrote the results section. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Exploring the mechanism of live streaming e-commerce anchors' language appeals on users' purchase intention

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Introduction: Live streaming e-commerce is an important way for consumers to shop nowadays. Anchors, as salesperson in live streaming e-commerce, greatly affect the sales of the broadcast room. This paper studies the influence mechanism of anchors' language appeals, rational appeal, and emotional appeal on users' purchase intention. This study establishes a research framework which based on stimulus-organism-response (SOR) theory, and constructs a model to reflect the relationship between anchors language appeals, self-referencing, self-brand congruity, and purchase intention.

Methods: Survey using a convenience sample (N=509) was conducted on Chinese mainland netizens through WJX platform (October 17-23, 2022) to obtain data. The partial least square structural equation modeling (PLS-SEM) method was used for data analysis.

Results: The study found that anchors' language appeals was positively correlated with self-referencing and self-brand congruity, and there is a positive correlation between self-referencing, self-brand congruity, and purchase intention. Self-referencing and self-brand congruity play a mediating effect between anchors language appeals and purchase intention.

Discussion: This study advances the literature on live streaming e-commerce research and SOR and provides practical implications to influence the strategy of the e-commerce anchors.

KEYWORDS

live streaming e-commerce, language appeals, self-referencing, self-brand congruity, purchase intention

1. Introduction

Live streaming e-commerce emerged in China in 2016, and several e-commerce platforms tested the live streaming e-commerce model (Fan et al., 2022). In 2016, Amazon was the first to launch a style code live show, where netizens watch a live stream and can place a purchase directly through a link below the video. Facebook also introduced a live e-commerce service in 2018. With this service, merchants start a live stream on the platform, users take a screenshot of their selected products, submit it to the merchants, and the merchant's replies with payment instructions *via* messenger. Data show that in 2019 the US live e-commerce scale was less than US$1 billion (Coresight Research, 2020), in just 2 years it soared to US$11 billion in 2021 and is expected to exceed US$25 billion in 2023 (Coresight Research, 2022), which is a very rapid growth. Since 2018, the development of

China's live-streaming e-commerce industry has become an industry trend, attracting a large number of funds and institutions to enter, with a surge in practitioners and market size. According to data released by the Department of E-Commerce of the Ministry of Commerce of the People's Republic of China, the overall market size of live e-commerce in China will reach 1.05 trillion yuan in 2020 (Ministry of Commerce of the People's Republic of China, 2020), far exceeding the $6 billion of the United States, the world's largest consumer market (Paper News, 2022). With the growth of live e-commerce, anchors engaged in live-streaming with goods are rapidly emerging, with celebrities, influencers, and government officials of all stripes joining the live-streaming bandwagon. During Amazon's Members' Day 11–13 July 2022, comedian Kevin Hart, Australian model Miranda Kerr, and actress Kyle Richards, among others, joined Amazon's live-streaming bandwagon anchors (NetEase News, 2022). An e-commerce anchor is a person who interacts with users and recommends products in a live stream (Sun et al., 2019; Park and Lin, 2020). With their unique personal charisma and professional knowledge, e-commerce anchors recommend products to users in various languages, talk about their experiences in trying or using products, and answer their pop-up questions in the live stream, which not only enhance the consumption atmosphere in the live stream, but also strengthen the close connection with users, alleviate their worries when shopping, and promote them to click to place a purchase. As an important link between consumers and products, e-commerce anchors have become a key influence on live streaming traffic and transaction volume, and their value is highly valued.

The strong marketing influence of e-commerce anchors on consumers has attracted scholars' research attention. Some scholars have studied the impact of anchor features on users' purchase intention. The more authoritative anchor identity is, the more it will stimulate consumers' purchase intention (Liu F. et al., 2020). The credibility and professionalism of anchors will affect consumers' purchase intention (Han and Xu, 2020). Some scholars have studied the influence of anchors' communication strategies on consumption intention. For example, the more similarity of communication styles between anchors and users, the higher the users' purchase intention (Wu et al., 2020). The interactivity of anchor language will also affect consumers' purchase intention (Sun, 2022). According to the study of Hu and Chaudhry (2020), anchors provide consumers with personalized recommendations, guidance, and services by means of in-line dialogue and barrage questioning, which has a positive impact on consumers' purchase intention. Anchors use voice, expression, or movement skills to answer consumers' questions, which can promote consumers to make purchasing decisions (Cai and Wohn, 2019).

Scholars have identified language appeals as an important factor influencing consumer behavior (Gong et al., 2021). Research in this area has also attracted the attention of researchers, focusing on two main areas. (1) The influence of linguistic appeals in advertising on consumer behavior. Some scholars focus on research on the type of advertising and the use of appeal strategies, e.g., some scholars focus on different types of advertising (Kim et al., 2019), while others have studied the use and effects of appeal strategies in the sale of different types of products (utility, hedonic, and technological; Kronrod and Danziger, 2013; Gahlot Sarkar et al., 2019; Motoki et al., 2019; Srivastava and Dorsch, 2020). Some scholars have focused on the mechanisms of appeal strategies on purchase behavior, such as the effect of celebrity endorsement on purchase behavior (Wang et al., 2013), the effect of inaccessible strategies such as emotional appeal, ability appeal, functional appeal, and experience on purchase behavior (Zarantonello et al., 2013; Kazakova et al., 2016; Kim et al., 2019). (2) The effect of language appeals of anchors on consumer behavior in TV shopping. Scholars study found that Language appeals is an important communication strategy for anchors. The language appeals of anchors is a vital factor in promoting consumers' purchase intention (Luna and Peracchio, 2005; Bishop and Peterson, 2010). Some researchers concentrate on the impact of communicators on consumers' purchasing decisions, including celebrities, specialists, and professional anchors (Ma and Jongchang, 2019; Zafar et al., 2020; Sun, 2022). Some researchers concentrate on understanding the mechanisms through which various appeal methods, including logical appeal, emotional appeal, and personalized appeal, affect consumers' perceptions of brands and their propensity to make purchases (Shih, 2011; Siddiqui and Nabeel, 2014; Jayathunga and Kumara, 2016; Luo et al., 2021). Webcasting has developed into a significant means of influence because of the growth of live online commerce. However, there are few researches on the influence mechanism of webcasting e-commerce about anchors' language appeals and users' purchase intention. Research on this relationship is valuable because it helps to explain how the language appeals of anchors contributes to the purchase intention of users. At the same time, the research results are helpful to promote the sales performance of live shopping. Therefore, the first research question of this paper is put forward: What is the influence mechanism of anchors' language appeals on users' purchase intention?

This study contributes in four ways: firstly, it extends current research on Internet consumer behavior by exploring how anchors' language appeals affect users' purchase intention. Secondly, it helps to deepen our understanding of the mechanisms by which anchors' language appeals influence users' purchase intention. Thirdly, the findings of the study can serve the development of promotional strategies for live marketing campaigns; fourthly, broadens the applicable scenarios of the stimulus-organism-response (SOR) theoretical framework, particularly in the context of China.

2. Theoretical framework and hypotheses

2.1. Theoretical basis

The stimulus-organism-response model was proposed by Mehrabian and Russell (1974) as a framework for explaining the effects of external environmental stimuli on individuals' cognition, emotion, and behavior. The SOR model is widely used to predict and explain consumer behavior in online marketing environments. Li et al. (2022) explored the effect of social presence in live streaming on customer impulse buying based on the stimulus–organism–response framework. Hu and Chaudhry (2020), used the SOR model to study how relationships (social and structural bonds) in live e-commerce enhance consumer engagement. The structural integrity of SOR model and its classification of the process of the influence of information stimulus on human behavior have been widely recognized by researchers. Therefore, this study uses the SOR model as the theoretical basis, anchors' language appeals as the stimulus, self-referencing and self-brand congruity as the organism state, Anchors' language appeals as the stimulus, self-referencing and self-brand congruity as the organism state, and purchase intention as the behavioral response.

2.1.1. Stimulus factors-anchors' language appeals

"Stimulus" is a "trigger" (Mehrabian and Russell, 1974) that causes a change in the internal or external state of an individual, which can be a source of information, message content, etc. According to Turley and Kelley (1997), language appeals to product promotion can be divided into rational and emotional appeals; Pang and Lee (2004) showed that rational and emotional appeals are two types of appeals that can significantly influence consumption intention. Based on this, this study classifies anchors' language appeals into rational appeal and emotional appeal. Rational appeal mainly changes consumers' psychological perceptions and purchase behavior by conveying factual information, such as product recommendations in terms of price, quality, and composition (Resnik and Stern, 1977). Affective appeal influences consumers' psychological perception and purchase behavior by stimulating consumers' emotions toward the brand and even toward the salesperson, such as product recommendation in terms of humorous appeal and nostalgic appeal (De Pelsmacker and Geuens, 1997).

2.1.2. Organism state: Self-referencing and self-brand congruity

"Organism" refers to the emotional and cognitive mediated states that arise when an individual interacts with external stimuli (Mehrabian and Russell, 1974).

Self-referencing refers to an individual comparing external information with self-relevant information stored in memory (Debevec and Romeo, 1992). Research has found that there is a self-referential effect on consumers' live shopping behavior, i.e., consumers compare the anchor with their self-characteristics (image, beliefs, personality, abilities, etc.), and the stronger the identification, the stronger their willingness to purchase (Hu et al., 2017). Study has found that when consumers receive information about products, they associate the information with their personal experiences, triggering the phenomenon of self-referencing， the outcome of treatment can affect their purchase intention (Burnkrant and Unnava, 1995; Martin et al., 2004). Research indicates that self-referencing is an important factor influencing consumers' purchase decisions (Chang, 2011; Yoon and Park, 2012).

Consumer buying behavior is not just about satisfying physical needs, but also about satisfying psychological desires. Consumers tend to buy brands that help express and shape their self-image (Levy, 1959). Gardner and Levy (1955) refer to this phenomenon as self-brand congruity. The similarity and match between self-image and brand image. Study found that consumers make congruent judgments after acquiring information about products, and when consumers produce stronger congruence, they show stronger willingness to purchase (Roy and Rabbanee, 2015). When users watch a live broadcast, they combine the brand image perceived through the linguistic description of the anchor with their own image, and the stronger the congruence between the two, the stronger their purchase intention (Islam et al., 2018). Many studies have pointed out that self-congruity (self-consistency) is an important factor that influences consumers to choose and purchase products (Peters and Leshner, 2013).

Based on the above discussion, self-referencing and self-brand congruity are both emotional and cognitive responses that occur when individuals interact with external stimuli (Sirgy, 1982; Bellezza, 1984). In this study, self-referencing and self-brand congruity were used as mediating factors.

2.1.3. Consumer behavior response: Purchase intention

The user's purchasing intention is referred to as the behavioral reaction in this study. Purchase intention is the subjective probability or potential that a consumer will purchase a specific good (Dodds et al., 1991). Purchase intention, according to Søndergaard et al. (2005), can be viewed as the irrational propensity of consumers to select particular goods, which develops during the process of product or service cognition prompted by external impacts.

2.2. Hypotheses

2.2.1. Relationship between anchors' language appeals and self-referencing

E-commerce anchors recommend products to consumers through language appeals (Sun et al., 2019). In this study, anchor appeals are divided into rational appeals and emotional appeals. It has been noted that both rational and emotional appeal evoke consumers' memories of their own experiences and trigger self-referential behaviors (Wang et al., 2013; de Graaf, 2022). On the one hand, rational appeal is used to motivate consumers by providing factual information (Lee et al., 2020). Emotional appeal, on the other hand, is used to arouse consumers' memories by stimulating their emotional responses (Lee et al., 2020). Anchors' language demands for products will increase users' self-information cognition and stimulate users' self-reference to a certain extent. As a result, this paper proposes hypothesis 1.

> *H1a*: Anchors' rational appeal has a positive influence on self-referencing.
>
> *H1b*: Anchors' emotional appeal has a positive influence on self-referencing.

2.2.2. Relationship between anchors' language appeals and self-brand congruity

Past research has found that consumers matched product's utilitarian attributes with their own ideal attributes through rational appeal, and matched product's value express attributes with their own self-concept through emotional appeal, creating self-brand congruity (Johar and Sirgy, 1991). When customers receive information, they will relate it to their self-image and have a tendency to choose brands that are consistent with their self-image (Heath and Scott, 1998). When the values conveyed by the brand are related to the values of consumers, consumers will have a positive attitude toward the brand (Michel et al., 2022). Anchors' language appeal to the brand will arouse users to compare the brand image with their self-image. If the two are consistent, they will increase their purchase intention. Thus, this paper proposes hypothesis 2:

> *H2a*: The rational appeal of the anchor has a positive impact on self-brand congruity.
>
> *H2b*: The emotional appeal of the anchor has a positive impact on self-brand congruity.

2.2.3. The influence of self-referencing on purchase intention

Self-referencing impacts customers' buying intentions (Debevec and Iyer, 1988; Wang et al., 2013). Consumers buy products in order to maintain or improve the self-image they pursue. The self-reference effect causes consumers to compare their self-image with the product image. A high level of self-referencing will provide more recognition and a larger desire to make a purchase (Wang et al., 2013; Yim et al., 2021). When users watch live broadcasts, they will empathize with and recognize the language demands of anchors, and trigger the self-reference effect, which will strengthen the psychological connection between users and anchors and further affect the purchase intention. Thus, this paper proposes hypothesis 3:

> *H3*: Self-referencing influences purchase intention in a favorable way.

2.2.4. The influence of self-brand congruity on purchase intention

Previous studies have pointed out that self-brand congruity has an important impact on consumers' purchasing behavior (Ekinci and Riley, 2003; Rabbanee et al., 2020). It is found that the higher the self-brand consistency of consumers, the more positive their attitude toward the product, the more likely they are to have the purchase intention (Liu C. et al., 2020; Wijnands and Gill, 2020). Customers are more likely to make purchases when their self-image is extremely aligned with that of the brand (Phua and Kim, 2018; Chen et al., 2021). Through rational and emotional appeals of anchor language, users connect self-concept with brand-image to improve their purchase intention. Hence, this paper proposes hypothesis 4:

> *H4*: Self-brand congruity has a positive impact on purchase intention.

2.2.5. The influence of self-referencing on self-brand congruity

Based on previous studies, the more self-referential consumers perceive, the more consistent their selves are with the brand, and the more likely they are to demonstrate a stronger sense of engagement, loyalty, and identity (Mehta, 1999). Through self-referencing, consumers compare information with themselves to promote the congruity between self-image and brand image. It has been found that consumers' self-referential behavior helps to facilitate consumers' association with brands and increase self-brand congruence (Wang et al., 2013). This paper argues that self-referencing triggered by anchors' verbal appeals affects users' self-brand congruence. Thus, this paper proposes hypothesis 5:

> *H5*: Self-referencing has a positive effect on self-brand congruity.

2.2.6. The mediating role of self-referencing between language appeals and purchase intention

Individuals' perceptions of verbal and visual stimuli can induce their self-referencing behaviors and then influence their attitudes and intentions (Debevec and Romeo, 1992). The appeals by communicators can stimulate consumers' self-referencing behaviors, thus influencing consumers' attitudes toward products (Yoon and Park, 2012). Further research has found that both verbal and non-verbal appeals can stimulate self-referential behavior, which in turn influences consumers' purchase intentions (Wang et al., 2013). The self-referencing effect is mediated by the fact that users are influenced by the verbal appeal of the anchor, which stimulates self-referencing and increases their perception of their self-image, and when their perception of their self-image matches the product recommended by the anchor, they increase their purchase intention. Thus, this paper proposes hypothesis 6.

> *H6a*: Self-referencing mediates between rational appeal and purchase intentions.
>
> *H6b*: Self-referencing mediates between emotional appeal and purchase intentions.

2.2.7. The mediating role of self-brand congruity between language appeals and purchase intention

Research has found that people will consider the degree of consistency between a product's brand image and their own image when screening the product, and the higher this consistency, the higher people's willingness to purchase the product (Yang, 2018; Chen et al., 2021). When consumers are exposed to brand information, they develop brand image perceptions and tend to purchase the brand if they perceive that their self-image and the image portrayed by the brand converge, or if they believe that the image portrayed by the brand can satisfy their self-image (Liu C. et al., 2020; Wijnands and Gill, 2020). In a study on brand filter conditions, self-brand congruence between brand filter conditions (self-endorsing vs. other-endorsing) and brand attitudes, purchase intention Yang (2018). Based on the existing studies, this paper further explores whether self-brand congruence plays a mediating effect between anchor language appeals and purchase intention. Thus, this paper proposes hypothesis 7.

> *H7a*: Self-brand congruity plays a mediating role between rational appeal and purchase intention.
>
> *H7b*: Self-brand congruity plays a mediating role between emotional appeal and purchase intention.

2.2.8. The chain mediating role of self-referencing and self-brand congruity

As mentioned in the previous section, the anchor's rational and emotional appeal act as stimuli to trigger consumers' self-referencing and self-brand congruity, which in turn influence consumers' purchase intentions. Meanwhile, self-referencing has an impact on the relationship between anchors' language appeals and consumers' self-brand congruity (Mehta, 1999). Research suggests that self-referencing encourages consumers to connect with brands and increases self-brand congruence, which in turn influences consumers' purchase intentions (Wang et al., 2013). A study by Phua and Kim (2018) also found that self-brand congruence interacts with self-referencing and perceived humor to influence consumers' brand attitudes and purchase intentions. Users perceive brand messages through anchor language appeals, and if users' self-reference increases, self-concept, and brand image are more likely to be congruent, which in turn increases purchase intentions. Thus, this paper proposes hypothesis 8:

> *H8a*: Self-referencing and self-brand congruity play a chain mediating role between rational appeal and purchase intentions.
>
> *H8b*: Self-referencing and self-brand congruity play a chain mediating role between emotional appeal and purchase intentions.

2.3. Model specification

Based on the above assumptions, the research model of this paper is constructed as follows (Figure 1). In this paper, the stimulus factors are rational appeal (RA) and emotional appeal (EA), the organism state is self-referencing (SR), self-brand congruity (SC), and the behavioral response is purchase intention (PI).

3. Research design

3.1. Measures

The questionnaire consists of two parts, the first part is the basic demographic information (including gender, age, and education level, etc.). The second part is the measurement of research variables (including rational appeal, emotional appeal, self-referencing, self-brand congruity, and purchase intention). In this study, questionnaire items using measurement variables were all from existing studies, and were modified according to the live streaming e-commerce scenario to ensure the accuracy and effectiveness of measurement items. Rational appeal was measured by using Resnik and Stern (1977) scale. Emotional appeal was measured by using De Pelsmacker and Geuens (1997) scale, and provocation and eroticism were excluded from the study due to legal restrictions on live streaming. Debevec (1995) scale was used for self-referencing. Self-brand congruity was adopted from Phua and Kim (2018) scale. Purchase intention was measured using Zeithaml et al. (1996) scale. Each item of the study variables was measured using a seven-point Likert scale (ranging from 1 = "completely disagree" to 7 = "completely agree").

To enhance the validity of the formal survey, a small preliminary survey was conducted between October 15 and 16, 2022, and 100 questionnaires were distributed. According to the results of the analysis of the pre-survey data, one measure of the independent variable emotional appeal had a factor loading (loadings) of 0.601, which was less than the standard 0.707 (Shimp and Sharma, 1987), so this questionnaire item was considered for deletion and the remaining items constituted the formal questionnaire for this study. The pre-study data were not applied to the final data analysis.

3.2. Data collection

The formal survey used a convenience sample for data collection, and the questionnaire was created on the Chinese online survey platform, Questionnaire Star,[1] to a sample of Internet users in mainland China. Respondents were informed of the purpose of the study before filling out the questionnaire and were aware that the survey was anonymous. The questionnaires were distributed from October 17 to October 23, 2022.

In the formal survey, 509 questionnaires were collected, and 482 questionnaires were obtained excluding the invalid questionnaires, and the percentage of valid questionnaires was 94.70%. The gender of the respondents was 55.40% female ($N = 267$) and 44.60% male ($N = 215$). 84.00% of the total sample were aged 18–35, and nearly 77.80% of the respondents had university or higher education. According to the Discovery Report "2022 Live E-Commerce Industry Report" (Discovery Report, 2022), 18–37 years old are the main group of live e-commerce consumers. The "Tmall 618 Taobao Live Consumer

1 www.wjx.cn

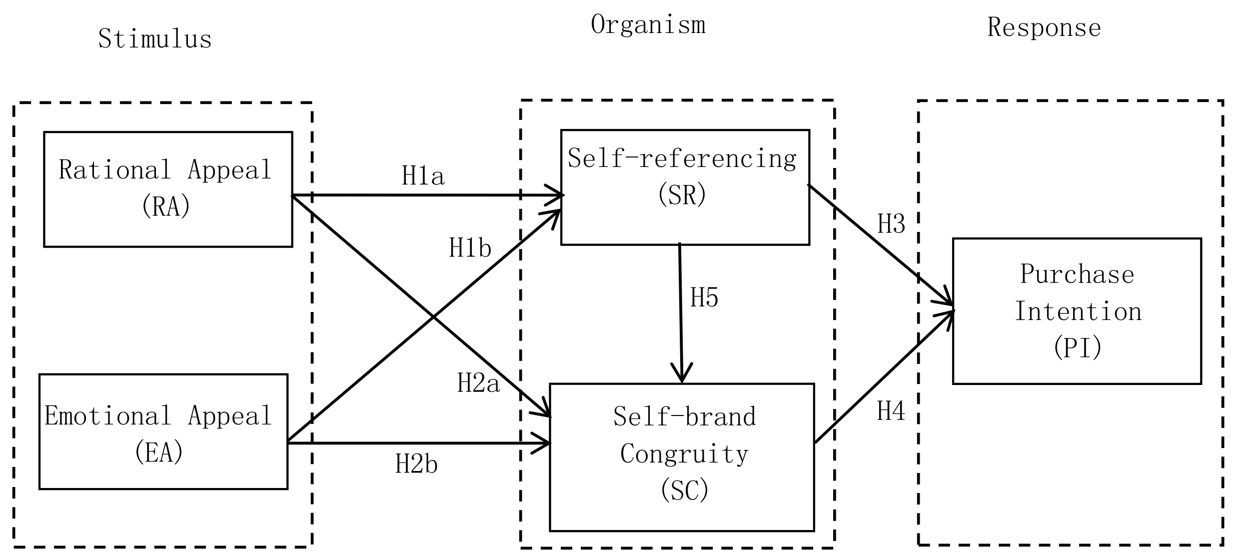

FIGURE 1
Conceptual model.

TABLE 1 Demographic characteristics of sample (N=482).

Variables	Item	Frequency	Ratio (%)
Gender	Male	215	44.60%
	Female	267	55.40%
Age	Under 18	17	3.50%
	18–24	283	58.70%
	25–35	122	25.30%
	Above 35	60	12.40%
Education	Below junior high school	14	2.90%
	Junior high school	23	4.80%
	High school	32	6.60%
	Specialist	38	7.90%
	Bachelor	235	48.80%
	Master	124	25.70%
	Phd and above	16	3.30%

TABLE 2 Mean, SD, excess kurtosis, and skewness.

Variables	Mean	SD	Excess kurtosis	Skewness
RA1	5.241	1.380	0.758	−0.894
RA2	5.046	1.418	0.133	−0.694
RA3	5.137	1.352	0.371	−0.705
RA4	4.934	1.488	−0.125	−0.549
RA5	5.160	1.434	0.347	−0.787
RA6	5.178	1.435	0.416	−0.852
RA7	4.952	1.453	0.298	−0.674
RA8	5.039	1.456	0.212	−0.675
RA9	5.019	1.511	−0.083	−0.690
RA10	4.934	1.424	−0.139	−0.501
RA11	4.828	1.457	−0.272	−0.454
RA12	4.587	1.663	−0.635	−0.403
RA13	4.558	1.712	−0.730	−0.389
RA14	4.766	1.587	−0.267	−0.576
EA1	4.994	1.579	0.142	−0.780
EA2	4.795	1.691	−0.389	−0.605
EA3	4.193	1.789	−0.859	−0.168
SR1	4.166	1.895	−1.041	−0.221
SR2	4.533	1.671	−0.485	−0.498
SR3	4.577	1.731	−0.562	−0.463
SB1	4.371	1.666	−0.672	−0.310
SB2	4.394	1.657	−0.569	−0.297
PI1	4.950	1.447	−0.053	−0.597
PI2	4.732	1.560	−0.434	−0.445
PI3	4.471	1.738	−0.674	−0.391

Portrait" (Taobao Live, 2019) released by Chinese live e-commerce giant Taobao Live also shows that the top three main consumer groups are 22–32, 12–21, and 33–40 years old. Taken together, the demographic information distribution of the survey respondents is broadly consistent with the demographic information characteristics of the current main consumer groups of live shopping. The demographic information of the sample is shown in Table 1.

4. Results

In this study, partial least squares structural equation model (PLS-SEM) was selected for data analysis and model test. The main reasons for PLS-SEM were as follows: first, PLS-SEM method is more suitable for exploratory research, and second, it is suitable for small sample research (Hair et al., 2019). Based on this, this paper selects SmartPLS 4.0 software for analysis.

4.1. Mean and standard deviations

Table 2 shows the arithmetic mean, standard deviation, and the relative importance of all study variables. The arithmetic mean and the relative importance of all the variables reach the average level. Thus, considering the study sample under examination and analysis.

4.2. Measurement model inspection

The test of measurement model is mainly to test various indicators of reliability, convergent validity, and discriminant validity (Hair et al., 2019). Reliability is an index to evaluate the stability and congruity of the model, which was evaluated by Cronbach's Alpha coefficient and combined reliability (CR). Cronbach's Alpha coefficient below 0.6 is considered untrustworthy, and above 0.8 indicates good reliability (Bagozzi and Yi, 1988). The minimum value of CR is 0.7, and the larger the value, the more the item can measure the latent variable (Nunnally, 1978). In this analysis, the reliability analysis results are shown in Table 3. Cronbach's Alpha coefficients and CR coefficients of all dimensions are greater than 0.7, indicating that each item has good reliability and good internal consistency.

Validity is an index to comprehensively evaluate whether the measurement model can accurately reflect the purpose and requirements of evaluation. Generally, it is tested from two aspects: convergence validity and discriminative validity. Convergence validity measures mean variance extraction (AVE) and factor load values. According to Bagozzi (1981), the AVE value is suggested to be greater than 0.5, and the higher the AVE, the better the convergent validity. According to the suggestion of Carmines and Zeller (1979), a loadings value greater than 0.707 has a good convergence validity. As can be seen from Table 3, the AVE and loadings values of each measurement item in this study are all greater than 0.5 and 0.707, indicating good convergent validity of the scale.

Discriminant validity refers to the distinction between items in different dimensions. In this paper, the Fornell–Larcker standard was adopted to evaluate the scale's discriminant validity (Fornell and Larcker, 1981). If the square root of the AVE of factors is greater than all inter-construct correlations, the discriminant validity is supported. As shown in Table 4, the value on the diagonal (in bold) is the square root value of each variable AVE, which is larger than the correlation coefficient of all other variables, indicating that all dimensions of the scale used in this study have good discriminative validity.

Discriminant validity refers to the distinction between items in different dimensions. In this paper, the Heterotrait-monotrait ratio standard was adopted to evaluate the scale's discriminant validity, and HTMT shall be less than 0.9 (Henseler et al., 2015). As shown in Table 5, HTMT are less than 0.8, indicating that all dimensions of the scale used in this study have good discriminative validity.

4.3. Structural model analysis

The structural model was examined by checking the path coefficient (β) and coefficient of determination (R^2). Figure 2 shows the results of the structural model test.

The relationship between anchor language appeals, self-referencing, self-brand congruity, and purchase intention was verified by examining the path coefficient (β). Rational appeal was significantly and positively correlated with self-referencing ($\beta = 0.241$; $p < 0.001$) and self-brand congruity ($\beta = 0.136$; $p < 0.001$), and hypotheses H1a and H2a held, indicating that anchors' rational appeal had a positive influence on users' self-referencing and self-brand congruity; emotional appeal was positively correlated with self-referencing ($\beta = 0.371$; $p < 0.001$) and self-brand congruity ($\beta = 0.165$; $p < 0.01$) were significantly positively correlated, and hypotheses H1b and H2b held, indicating that anchor emotional appeal has a positive influence on users' self-referencing and self-brand congruity. Self-referencing was significantly and positively correlated with purchase intention ($\beta = 0.255$; $p < 0.001$), and self-brand congruity was significantly and positively correlated with purchase intention ($\beta = 0.319$; $p < 0.001$), and hypotheses H3 and H4 hold, indicating that users' self-referencing and self-brand congruity have a positive influence on purchase intention. Self-referencing was significantly and positively correlated with self-brand congruity ($\beta = 0.508$; $p < 0.001$), and hypothesis H5 holds, indicating that user self-referencing has a positive effect on self-brand congruity.

As can be seen from Figure 2, the explanatory power R^2 of self-referencing and self-brand congruity to purchase intention is 0.271, the explanatory power R^2 of rational and emotional appeal to self-referencing is 0.279, and the explanatory power R^2 of rational and emotional appeal to self-brand congruity is 0.456.

4.4. Intermediary effect verification

This study analyzes the mediating effect according to the method proposed by Zhao et al. (2010), and the results are shown in Table 6. Self-referencing and self-brand congruity mediate the influence of rational appeal and emotional appeal on purchase intention. The VAF

TABLE 3 Reliability and validity results of measurement model.

Variables	Items	Loadings	Cronbach's alpha	Rho_A	CR	AVE
RA	RA1	0.744	0.953	0.957	0.958	0.622
	RA2	0.796				
	RA3	0.777				
	RA4	0.803				
	RA5	0.777				
	RA6	0.723				
	RA7	0.788				
	RA8	0.759				
	RA9	0.818				
	RA10	0.824				
	RA11	0.828				
	RA12	0.812				
	RA13	0.782				
	RA14	0.799				
EA	EA1	0.817	0.808	0.816	0.886	0.722
	EA2	0.873				
	EA3	0.859				
SR	SR1	0.889	0.880	0.883	0.926	0.807
	SR2	0.904				
	SR3	0.901				
SC	SC1	0.934	0.861	0.862	0.935	0.878
	SC2	0.940				
PI	PI1	0.894	0.863	0.864	0.916	0.785
	PI2	0.886				
	PI3	0.878				

TABLE 4 Fornell–Larcker criterion (comparison of square root of average variance extracted and inter-construct correlations).

Variables	Emotional appeal	Purchase intention	Rational appeal	Self-brand congruity	Self-referencing
Emotional appeal	**0.850**				
Purchase intention	0.337	**0.886**			
Rational appeal	0.418	0.438	**0.788**		
Self-brand congruity	0.461	0.482	0.406	**0.937**	
Self-referencing	0.472	0.459	0.396	0.639	**0.898**

The square root of average variance extracted (AVE) is shown on the diagonal of the matrix.

TABLE 5 Discriminant validity of measurement model (HTMT).

Variables	Emotional appeal	Purchase intention	Rational appeal	Self-brand congruity	Self-referencing
Emotional appeal					
Purchase intention	0.407				
Rational appeal	0.472	0.484			
Self-brand congruity	0.548	0.559	0.439		
Self-referencing	0.555	0.526	0.425	0.730	

values were 30.10, 31.35, 23.00, and 20.31%, respectively, indicating that self-referencing and self-brand congruity played a partial mediating role in the relationship between the two groups of independent variables and dependent variables.

4.5. Verification of the effect of chain mediation

The psychological process of consumers' purchase intention is complex, and multiple mediating variables are often needed to more clearly explain the effect of independent variables on dependent variables (MacKinnon, 2012). Through data analysis (Table 7), this study found that the influence of host language appeal on users' purchase intention is realized through two ways: "Rational appeal—self-referencing—self-brand congruity—purchase intention" and "emotional appeal—self-referencing—self-brand congruity—purchase intention," assuming that H8a and H8b are valid, the VAF is 21.31 and 22.39%, respectively, that is, the mediating variables self-referencing and self-brand congruity play a chain mediating role.

5. Discussion

5.1. Research conclusions

This paper studies the influence mechanism of anchors' language demands on users' purchase intention in the scenario of live streaming e-commerce, as well as the role of self-referencing and self-brand congruity. After data analysis and structural equation model verification, we draw the following conclusions.

5.1.1. Anchors' language appeals have a positive impact on users' self-referencing

The validity of hypotheses H1a and H1b indicates that the rational and emotional demands of anchors have a significant positive influence on users' self-referencing. After receiving the information about the rational and emotional demands of anchors, users will compare these information with their own relevant experiences. Sun et al. (2019) showed that rational appeal from anchors increases consumers' informational perceptions, triggering them to refer to factual information about the brand with their own experiences and influencing their subsequent purchase behavior, while Dong and Wang (2018) showed that emotional appeal from anchors increases the emotional connection with users, facilitating them to associate themselves with emotional information about the brand and increasing their favorability toward the brand. Increase users' favorable perception of the brand. It is worth noting that according to the path coefficients, the path coefficient of the influence of the anchor's language rational appeal on self-referencing is 0.241, while the path coefficient of the influence of the emotional appeal on self-referencing is 0.371, indicating that the influence of the emotional appeal is more significant than that of the rational appeal. This is consistent with research on online sales (Ahn et al., 2022). This result explains some of the impulsive consumption behavior that occurs in the broadcast room.

5.1.2. Anchors' language appeals have a positive impact on users' self-brand congruity

The establishment of H2a and H2b holds that anchors' rational and emotional appeal have a positive impact on users' self-brand congruity. In live e-commerce shopping, users are influenced by the linguistic appeals of the anchor, and their perception of the brand image changes, believing that the brand image described by the anchor through language is in line with their self-image. Once the user develops this perception of convergence between self-image and brand image, a self-brand congruence effect occurs. The results showed that the path coefficients of rational appeal and emotional appeal on self-brand congruity were 0.135 and 0.165, respectively, with no significant difference. This result shows that, no matter whether the host uses a rational way or an emotional way, users will compare the information with their self-image after receiving the

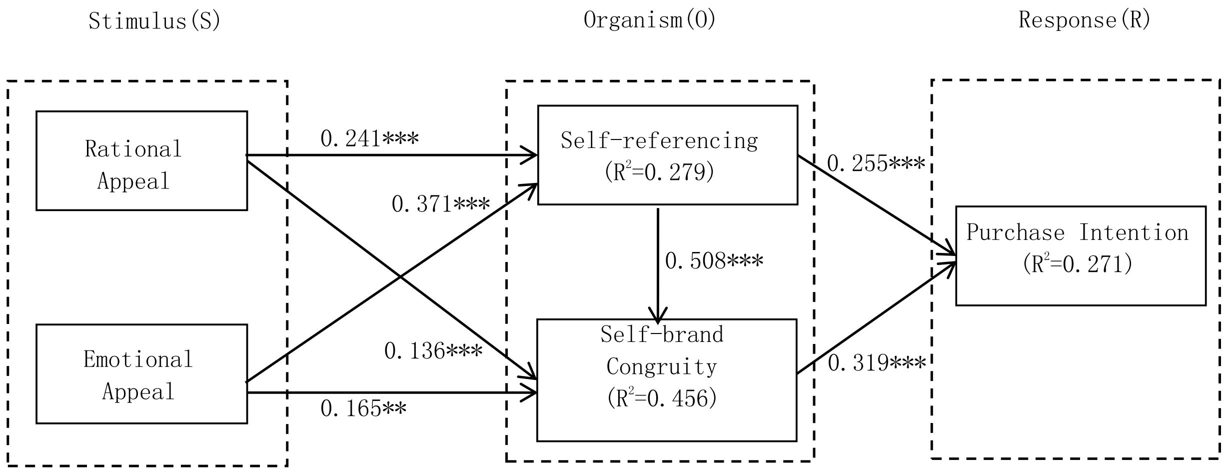

FIGURE 2
Structural equation model results diagram. ***p<0.001 ; **p<0.01.

TABLE 6 Results of mediation effect analysis.

Independent variables	Mediation variables	Dependent variable	Direct effects (T statistics)	Indirect effects (T statistics)	Total effects	VAF	Results
RA	SR	PI	0.144 (4.662)	0.062 (2.614)	0.206	30.10%	H6a supported
EA	SR		0.208 (7.433)	0.095 (3.380)	0.303	31.35%	H6b supported
RA	SC		0.144 (4.662)	0.043 (2.030)	0.187	23.00%	H7a supported
EA	SC		0.208 (7.433)	0.053 (2.634)	0.261	20.31%	H7b supported

VAF < 20%: no intermediary effect; 20% < VAF < 80%: partial mediation effect.

information. Therefore, the language appeal of anchors should adopt a combination of rationality and sensibility, so as to generate self-brand consistency among users under the joint action of both. This conclusion is consistent with the research results of Chen et al. (2022).

5.1.3. Self-referencing and self-brand congruity have a positive impact on users' purchase intentions

The validity of hypothesis H3, that self-referencing has a positive effect on users' purchase intention, suggests that, after receiving recommendations from anchors, users will process information related to their self-concept and the resulting results will influence their consumption decisions. Consumers' purchases are often motivated by a desire to obtain symbolic meaning for a product or service, and the self-reference effect arises when the symbolic meaning of a product is consistent with the consumer's existing or desired sense of self (Lee and Heo, 2016; Lee and Mackert, 2017; de Graaf, 2022). Under the self-reference effect, consumers will tend to purchase products that are consistent with their self-identity or status. Therefore, anchors should strive to align the products they recommend with the user's sense of self through verbal appeals. This is consistent with the results of Yaniv et al. (2011).

The validity of hypothesis H4, that self-brand congruity has a positive effect on users' purchase intentions, suggests that users who receive recommendations from anchors process them in relation to their self-image, and the resulting results influence their consumption decisions. Anchors establish some connection between their recommended brands and users through language appeals. The higher the consistency between self-image and brand image of users, the higher their purchase intention will be. This result is consistent with the findings of Grénman et al. (2019) and Aw et al. (2019), which is better explains that in the practice of live streaming e-commerce, anchors constantly interact and communicate with users through language to enhance their understanding of users. The purpose is to establish a connection with the recommended products according to the self-image cognition of users, form a self-brand consistency, and then enhance the purchase intention of users.

5.1.4. Self-referencing have a positive impact on self-brand congruity

The validity of hypothesis H5, that self-referencing positively influences users' self-brand congruity, suggests that after receiving a recommendation from the anchor, users first compare it with their self-experience for referencing, then make a comparison of congruity between their self-image and brand image. Users of live e-commerce are influenced by the linguistic appeals of the anchor in watching the live broadcast, creating a self-referential effect by connecting with information that already exists. Under the self-referencing effect, the user's self-image perception will in turn influence product (brand) preference, i.e., the user tends to choose products (brands) that match their self-image, thus building self-brand consistency. The higher this self-brand consistency is, the more likely they are to buy. This is consistent with the findings of Mehta (1999). This result tells us that in the practice of live e-commerce, the anchor should trigger the user's

TABLE 7 Analysis results of chain mediation effect.

Independent variables	Mediation variables		Dependent variable	Direct effects (*T* statistics)	Indirect effects (*T* statistics)	Total effects	VAF	Results
RA	SR	SC	PI	0.144 (4.662)	0.039 (3.308)	0.183	21.31%	H8a supported
EA				0.208 (7.433)	0.060 (3.923)	0.268	22.39%	H8b supported

VAF < 20%: no intermediary effect; 20% < VAF < 80%: partial mediation effect.

self-reference through verbal appeals, forming a perception and construction of self-image and being able to associate self-image with brand image, generating self-brand congruence.

5.1.5. Self-referencing and self-brand congruity mediate between language appeals and purchase intentions

The validity of hypotheses H6a and H6b, that self-referencing plays a partially mediating role between anchors' language appeals and users' purchase intentions, suggests that anchors recommend products to users by means of rational appeal and emotional appeal, and these messages cause users to engage in self-referential processing, and when self-referential congruity is high, users' purchase intentions are also high. This result, is in line with the studies of Chang and Lee (2011) and Ahn et al. (2017). This result suggests that the linguistic appeal of the anchor prompts users to recall information about their selves in their memories, that they associate this information about their self-image with the product recommended by the anchor, and that they are inclined to buy the product when they find that the symbolic meaning of the product recommended by the anchor is consistent with the self-image that the consumer already has or wishes to acquire.

The validity of hypotheses H7a and H7b, that self-brand congruity partially mediates the relationship between anchors' language appeals and users' purchase intentions, suggests that anchors recommend products to users by means of rational and emotional appeal, and that this information causes users to engage in comparative processing of self-brand congruity, and that when congruence is high, users' purchase intentions are also high. When users buy commodities in the broadcast room, they are not only based on quality, price and practical performance, but also whether the brand characteristics are in line with self-image as an important selection criteria (Phua and Kim, 2018; Wijnands and Gill, 2020). If users can find the consistency between the brand and self-image or evaluation from the anchor language appeal, that is, the self-brand consistency is high, consumers will buy the product. This result is in line with the studies by Sop and Kozak (2019) and Holmes (2021).

5.1.6. The chain mediating role of self-referencing and self-brand congruity

Hypotheses H8a and H8b, where self-referencing and self-brand congruity play a chain mediating role between the anchor's language appeal and the user's purchase intention, are established. The study shows that there is a relationship in which the anchor's language appeal triggers self-referential processing by the user, and when self-referential consistency is high, the user also makes a comparison of self-brand congruity, and when the user feels that self-brand congruity is high, his or her purchase intention is also high. This result is in line with the study of Phua and Kim (2018). The existence of chain mediation suggests a complex process from the verbal stimulation of the anchor to the generation of willingness to purchase, with a series of psychological changes that occur in between, and suggests that there is a complex processing of product information and purchase decision making behavior in live shopping.

5.2. Theoretical implications

1. The "black box" of consumer purchasing behavior refers to the fact that before consumers make purchases, merchants do not understand the mechanism of consumers' purchasing behavior and purchase intention (Michon and Chebat, 2008). This study constructs a model of the mechanism of the influence of anchors' language appeals on users' purchase intention, which deepens our knowledge of the mechanism involved and enriches theoretical studies of consumer behavior. Revealing the "black box" consumers buy in the marketing mode of live streaming e-commerce is an innovative exploration of the black box consumers buy in live streaming e-commerce.
2. This study finds that self-referencing and self-brand congruity play an important role in promoting users' purchase intention in the live broadcast. As Lee et al. (2020) and Yang (2018) showed, self-reference and self-brand congruence play a mediating role between external stimuli and consumers' purchase intentions, and we further sub-found that these two factors are also important mediators of consumer roles in live e-commerce. The findings can provide theoretical references for the design of anchors' communication discourse to users.
3. This study constructs a new research model with good explanatory power based on the SOR theoretical framework, which broadens the applicable scenarios of the SOR theoretical framework.

5.3. Practical significance

1. Anchors' rational and emotional appeal are able to trigger users' processing behavior of product information, which indicates that anchors should consider the rational and emotional appeal strategies when planning live communication discourse. The use of rational and emotional appeal strategies should be taken into account in the planning of live communication, neither can be neglected. The impact of emotional appeal is more significant. Therefore, anchors should pay emotional appeal strategies to recommend to users in the live broadcast room.
2. The study reveals the important role of self-reference effect in live marketing. The significant role of self-referencing in the

model suggests that anchors should focus on stimulating consumers to produce self-referencing. On the one hand this will help promote consumers' awareness of the product brand, on the other hand this can also promote consumers' willingness to buy.

3. The study found that live marketing should focus on brand promotion at the same time when promoting products. The significant role of self-brand congruity in the model suggests that anchors should focus on self-brand congruity assessment of the product when designing promotion tactics, which can help enhance users' purchase intention.

5.4. Limitations and future research

As with any research, this study has some limitations.

First, this study is based on convenience sampling for data collection, although this method has been widely adopted by the academic community for its convenience and low cost advantages. To draw more general conclusions, researchers may conduct surveys in different countries or regions under various situations in the future.

Second, all of the data in this study was collected by way of self-reporting, which may involve a subjective bias. Future studies should attempt to use different methods (e.g., psychological experiments, internet ethnography) and different types of data (e.g., objective data) to improve the results' validity.

Third, we tested the mediating of self-referencing and self-brand congruity, and more work is thus needed to validate other factors which may also act as mediators.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

According to national legislation and institutional requirements, this study does not require written informed consent.

Author contributions

EM: conceptualization, funding acquisition, project administration, resources, and supervision. EM and JL: data curation, investigation, and writing—original draft. KL and JL: formal analysis and methodology. EM and KL: validation and writing—review and editing. JL: visualization. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1109092/full#supplementary-material

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Factors influencing the behavioral intention to use contactless financial services in the banking industry: An application and extension of UTAUT model

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Introduction: Contactless financial services are an innovative exploration of the banking industry to integrate digital technology. This study further modified the UTAUT model based on the theories of trust, perceived risk, and perceived advantage and constructed a conceptual model to examine the influencing factors of the behavior of using contactless financial services. The purpose of this paper is to figure out factors influencing users' behavior intention of contactless financial services, in order to promote use behavior, and boost the further development of contactless financial services.

Methods: The model was validated using the data collected through questionnaires. The structural equation modelling (SEM) method was used to validate the research model. We analyzed the generated hypotheses by using AMOS version 23.0. In this study first analyzed the measurement model to test the reliability and validity of the instrument, and then analyzed the structural model to test our research hypotheses.

Results: The results reveal that trust and perceived risk are important factors that affect the behavioral intention of contactless financial services; users perceive that contactless financial services have advantages over traditional offline channel, their intention to use contactless financial services will be increased; social influence also has a positive impact on behavioral intention.

Discussion: This paper not only provides a theoretical understanding of contactless financial services use behavior but also offers practical insights to government legislative branches and app developers. By providing personalized services and refining the policies and regulations in the digital environment to promote the development of contactless financial services.

KEYWORDS

contactless financial services, banking industry, unified theory of acceptance and use of technology model, trust, perceived risk, perceived advantage

1. Introduction

The COVID-19 pandemic, as a public health emergency, occurred at a turning point of the great changes in globalization and has had a profound impact on the global economy and society. Under the influence of the pandemic, labor-intensive, contact industries have encountered serious operational crises. New forms of the contactless economy (e.g., intelligent logistics, online education, e-government, and telecommuting) supported by digital technologies have emerged during the fight against the pandemic (Ping, 2020). In the coming period, the new business model of contactless services will replace the traditional business model more rapidly and play a role in the transformation and upgrading of industrial and economic structures. In such a context, the banking sector, as a provider of financial services, needs to be further integrated with digital information technology to accelerate the digital transformation of the industry and improve the ability to provide contactless financial services (Ba and Liu, 2020).

Contactless finance is not an unfamiliar concept. American scholars introduced the concept of service encounter at the end of the 20th century and considered it the interaction process between customers and employees. With the development of technology, new services such as self-service devices and Internet services have gradually emerged, drawing attention and being advocated. Thus, intangible encounters have become an integral part of service encounters. In this study, contactless finance refers to the contactless operation of financial institutions in providing users with financial services such as payment and settlement, wealth management, and asset financing through telecommuting and online operations.

Contactless financial services are a part of the digital financial innovation in China's banking industry due to the changing business environment. At a certain stage of development, the banking industry is bound to face the bottlenecks such as redundant institutions, increasing operating costs, and declining operating income. In addition, users' demand for online, personalized, and contactless services has been stronger amid the COVID-19 pandemic. Therefore, contactless financial services demonstrate the achievements of deepening digital transformation in the banking industry and an inevitable choice for banks to carry out the strategic transformation that can improve quality and efficiency. At present, contactless financial services are significant as they help the banking industry adapt to the impact of the pandemic in the short term and seek new drivers of business growth in the medium and long term. These services are now being integrated into enterprises' production and people's lives at an unprecedented speed, breadth, and depth, injecting new momentum into the real economy and people's lives.

It can be seen from the development of contactless financial services in China's banking industry in recent years that some pioneers in the field of digital transformation have used digital technology and financial means to innovate services before the pandemic and realized low-contact or even contactless financial services (Ba and Liu, 2020). After years of exploration and technological investment in the banking industry, contactless financial services have shown some problems while making a progress. For example, many banks simply regard contactless financial services as a supplement to offline services, and the small range of products and services fails to meet customers' various needs. As a result, customer stickiness is not high. Meanwhile, the model of contactless financial services has weakened the environment to implement risk management policies, laws, and regulations based on traditional offline banking outlets, which threatens users' privacy and property security, causes a trust crisis, and hinders the further development of contactless financial services.

Contactless financial services are an innovative exploration of the banking industry to integrate digital technology. Existing studies in this field are mainly focused on the content and patterns of the services, and the use behavior of contactless financial services has been rarely investigated. In response to this situation, this study focused on the use behavior of contactless financial services. It constructed a theoretical model based on the UTAUT model and trust theory and conducted an empirical study using data collected through questionnaires in order to provide relevant suggestions for the improvement of contactless financial services, promote use behavior, and boost the further development of contactless financial services.

2. Literature review and hypothesis development

2.1. Perceived risk and trust

The concept of perceived risk, initially deriving from psychology, was proposed by Bauer (1960). The theory refers to the extent to which the loss caused by the use of a certain new technology or product deemed by the users affects their acceptance of the technology or product, involving psychological, economic, and temporal aspects, among others. The perception of perceived risk is the core that influences users' intention to pay.

Information systems are vulnerable and potential risks are inevitable, so security has been an ever-present issue since the creation of the Internet. When users decide whether to adopt an innovation, they evaluate it through their own or others' experience and adopt risk-reducing strategies to avoid high-risk services (Cox and Rich, 1964). Research has shown that users' perceptions of risks will influence their purchasing decisions (Park et al., 2005) and technology adoption (Lu et al., 2005; Martins et al., 2014). According to studies on e-commerce, perceived risks have a negative and significant effect on consumers' willingness to purchase online (Wingate, 2019). Similarly, studies on e-payments have found that perceived risks have a negative effect on the use of online payments (Chang, 2018).

In this study, perceived risk refers to the user's perception of adverse consequences due to uncertainty when using contactless financial services. Compared with traditional face-to-face purchases and payments, contactless financial services are mainly remote purchases of products or receipts of services, during which users may perceive the risks of exposing personal information, personal financial losses, and increasing unspecified costs. As a result, their intentions to use contactless financial services is reduced (Ba and Liu, 2020).

Trust can motivate human initiative and action consciousness. In the era of the Internet economy, since there is no direct communication and interaction between the buyer and the seller, and the consumer trust in products and services will increase the trend of purchase and use, trust has become the focus on academics (Larasetiati and Ali, 2019; Wu and Chen, 2020). Trust is the foundation of all commercial activities and behaviors and has become a focal point in the academic community in the era of a booming Internet economy as it can mobilize people's agency and consciousness of action (Wu and Chen, 2020). In the theory of reasoned action (TRA) established by Fishbein and Ajzen (1975), trust, as a behavioral intention, is often used by consumers as a tool to reduce uncontrollability, uncertainty, and transaction costs in decision-making in risky environments. According to the basic attitude-intention-behavior framework, consumers establish trust beliefs to minimize perceived risk, which influences individual trust attitudes and ultimately affects the intention to use a service or product and behavioral outcomes.

The relationship between trust and purchase intention, Liu and Guo (2017) indicated that trust positively affects purchasing intentions. Di Zhao et al. (2019) also found customers have a sustainable purchase when they trust the seller and trust is an important factor in increasing interest in online shopping (Pappas, 2018). Studies have shown that trust is an important factor in user adoption of new technologies and products. In the study on the adoption of mobile banking, Zhou (2011) predicted that trust is the initial factor for users to adopt mobile banking and confirms that trust is the key factor for users to decide whether to use mobile banking. In addition, Hanafizadeh et al. (2014) revealed that trust and perceived trustworthiness are the key drivers for customers of Iranian banks to adopt mobile banking; Jiang et al. (2020) also pointed out that trust plays a positive role in users' choice to use online consumer credit products.

In this study, trust refers to the extent to which users trust the information, products, and operational mechanisms provided by contactless financial services. With a growing trend of online transactions, many financial institutions (e.g., banks, securities, etc.) regard contactless platforms as important vehicles for publicity and marketing. In such a context, it is important for contactless financial services to provide reliable and objective information and products and operate a robust transaction mechanism to gain users' trust. Trust affects users' intention to use a product or service (Xu, 2021). Therefore, the following hypotheses were formulated.

> *H1*: Perceived risk will have a negative effect on users' trust.
>
> *H2*: Perceived risk will have a negative effect on users' behavioral intention.
>
> *H3*: Trust will have a significant effect on users' behavioral intention.

2.2. Unified theory of acceptance and use of technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) was proposed by Venkatesh based on eight established information adoption models such as the Technology Acceptance Model (TAM) and the theory of planned behavior (TPB) (Venkatesh et al., 2003). In UTAUT, constructs of the eight models are integrated into four core constructs, performance expectancy, effort expectancy, social influence, and facilitating conditions, which explain users' adoption behavior of information technology. Since its introduction, the UTAUT model has been used to analyze users' intention to accept and use emerging information technologies, such as instant messaging software and mobile banking. Empirical tests have demonstrated that the UTAUT model has a 70% explanatory power for individual use behavior, better than the TAM model and the TRA model (Li and Yuan, 2020; Chen and Liang, 2021). The UTAUT model is the most used model with the best reliability in the academic community. Currently, it has been applied in several fields and has been proven to have great explanatory power. For example, Chao (2019) used the extended UTAUT model to study the behavioral intention of use mobile learning. Rashmini et al. (2020) used the UTAUT model to examine the adoption behavior of users in developing countries for mobile online banking. Alajmi and Alotaibi (2020) used the UTAUT model to study the intention to use mobile libraries. According to the analysis of studies from various countries, the UTAUT model greatly varies in terms of the significance of variables' effects and applicability in different situations. To solve the problem, case-by-case analyses are needed to identify the key influencing factors in different application situations (Li and Yuan, 2020). Li and Min (2021) used the UTAUT model and CCC moderating effect to study the continued intention to use Moocs. Contactless financial services, as a new type of comprehensive financial services, change the traditional way of financial institutions to provide services with the help of physical outlets and a simple vehicle of voice, and they are different from the traditional mode in terms of the content and forms of services. Therefore, users' intention and behavior to use the emerging contactless financial services may be explained by the UTAUT model to a certain extent, and the UTAUT model is used as the theoretical basis for this study.

According to the UTAUT model, performance expectancy, effort expectancy, and social influence affect behavioral intention and then the actual use behavior, while facilitating conditions directly impact use behavior. In the UTAUT model, performance expectancy is defined as users' expectation that technologies and products can improve individual performance (Venkatesh et al., 2003). In this study, performance expectancy emphasizes the extent to which users recognize the improvements and enhancements brought by contactless financial services to their personal lives, work, etc. Effort expectancy refers to the extent to which users can easily accept new products and technologies, which in this study refers to the degree of difficulty perceived by users when using contactless financial services. Social influence denotes the degree of influence exerted by the surrounding groups perceived by users when using new technologies. Users' intention to use contactless financial services might be influenced if their friends, relatives, and those who have a great influence on them are using these services.

Facilitating conditions refer to the extent to which users believe that the existing organization and technological structures can support the use of contactless financial services. However, with the popularity of intelligent communication devices, it has become much easier for users to obtain and use devices that support online consultation. In other words, as mobile intelligent devices have been widely used, the UTAUT is adjusted in this study according to the current situation, in which "facilitating conditions" is no longer used as a main factor influencing use behavior (Xu, 2021). Therefore, the following hypotheses were formulated.

> *H4*: Performance expectancy will have a significant effect on users' behavioral intention.
>
> *H5*: Effort expectancy will have a significant effect on users' behavioral intention.
>
> *H6*: Social influence will have a significant effect on users' behavioral intention.
>
> *H7*: Users' behavioral intention will have a significant effect on users' use behavioral.

In the research system of trust in e-commerce, when consumers think that their needs match the expected performance of a product, their satisfaction will increase and the uncertainty in decision-making will decrease, which helps them to build trust in the product, having a positive impact on consumers' behavioral intentions (Jiang et al., 2020). Martin et al. (2015) verified that users' expectations of products and technologies in different decision-making situations have significant effects on the formation of individual trust. Meanwhile, in the research field of sociology, from the perspective of social relations and social culture, the building of trust in a particular object is influenced by cultural norms. In other words, social influences have effects on individual trust (Jiang et al., 2020). Currently, it has been proved that the opinions of people around an individual can affect individual trust (Yang et al., 2016). Therefore, the following hypotheses were formulated.

> *H8*: Performance expectancy will have a significant effect on trust.
>
> *H9*: Social influence will have a significant effect on trust.

2.3. Perceived advantage

Perceived advantage refers to the relative advantage of an information system in terms of information content, functional services, and system interface as perceived by users compared with other types of information systems (Wrycza et al., 2017). As Internet technologies continue to integrate with other industries, the comparison of advantages between channels has attracted academic attention. Researchers have studied the advantages of new channels in the context of the Internet perceived by users and proved that perceived advantages have a positive impact on user's intention to use a product or service (Rosenzweig and Roth, 2007; Wu et al., 2019; Huang et al., 2020). In an earlier qualitative study, Lee et al. (2003) pointed out that the perceived advantage plays a significant role in improving users' attitudes toward mobile banking. Similarly, Püschel et al. (2010) claimed that Brazilian customers' attitudes toward mobile banking are significantly influenced by perceived advantage. And Lin (2011) also found that perceived advantage plays a key role in driving attitudes toward banking and ultimately leading users to adopt mobile banking.

In this study, contactless financial services are innovative channels for financial services. If users perceive that contactless financial services have advantages over traditional offline channels and the simple channels of customer service centers in terms of efficiency, products, and services, their intention to use contactless financial services may be boosted. Therefore, the following hypothesis was formulated.

> *H10*: Perceived advantage will have a significant effect on users' behavioral intention.

3. Research methodology

3.1. Research model

Based on the above analysis, this paper built a research model based on the UTAUT model. Eight constructs, namely performance expectancy, effort expectancy, social influence, trust, perceived risk, perceived advantage, behavioral intention and use behavior were selected based on the theories of perceived risk, trust, and perceived advantage. The model was used to explore the behavior of using contactless financial services (Figure 1).

3.2. Measure instrument

Following the above analysis, eight constructs are included in the conceptual model. All of the constructs are measured by multi-item scales adapted from prior studies with minor change in wording in order to fit contactless financial services' characteristics (as shown in the Appendix). This study drew on the studies by Venkatesh et al. (2003), Jiang et al. (2020), and Rashmini et al. (2020) to measure performance expectancy, effort expectancy, social influence, behavior intention, and use behavior, drew on the studies by Bauer (1960), Fishbein and Ajzen (1975), Wu and Chen (2020), and Xu (2021) to measure perceived risk and trust, drew on the studies by Wrycza et al. (2017), and Huang et al. (2020) to measure perceived advantage. A five-Likert scale, from strongly disagree to strongly agree, is adopted to measure the eight constructs. At last, in order to ensure the logical consistency and ease of understanding of the questionnaire, we sent 32 questionnaires to peer experts for pilot test to refine the questionnaire wording before formal data collection. On the whole, the questionnaire was unambiguous and easy to complete (Figure 2).

3.3. Questionnaire design and data collection method

The questionnaire method was used to collect users' subjective data. The questionnaire consists of three parts: introduction, personal information collection, and the scale. The introduction part briefly illustrates the purpose of this study and matters such as the protection of users' private information and explains the screenshots of the pages of contactless financial services provided by several representative banks (e.g., Industrial and Commercial Bank of China, China Minsheng Bank, Bank of Communications, etc.). The users filled in the questionnaire after reading the above content. The part of users' demographic characteristics collected information about gender, age, education, etc. The scale part collected information about the eight constructs, namely performance expectancy (PE), effort expectancy (EE), social influence (SI), behavioral intention (BI), trust (TRU), use behavior (UB), perceived risk (PR), and perceived advantage (PA).

To ensure that the respondents cover a comprehensive range of people and are representative, the population aged between 18 and 65 was selected as the main respondents, taking into account the actual situation of the use of contactless financial services and mobile communication devices. Electronic questionnaires were distributed *via* a questionnaire website, and 411 valid questionnaires were collected from 7 September to 30 September 2022.

3.4. Demographic

The 2021 White Paper on Digital Banking in China> shows that younger users have weaker preferences for offline banking

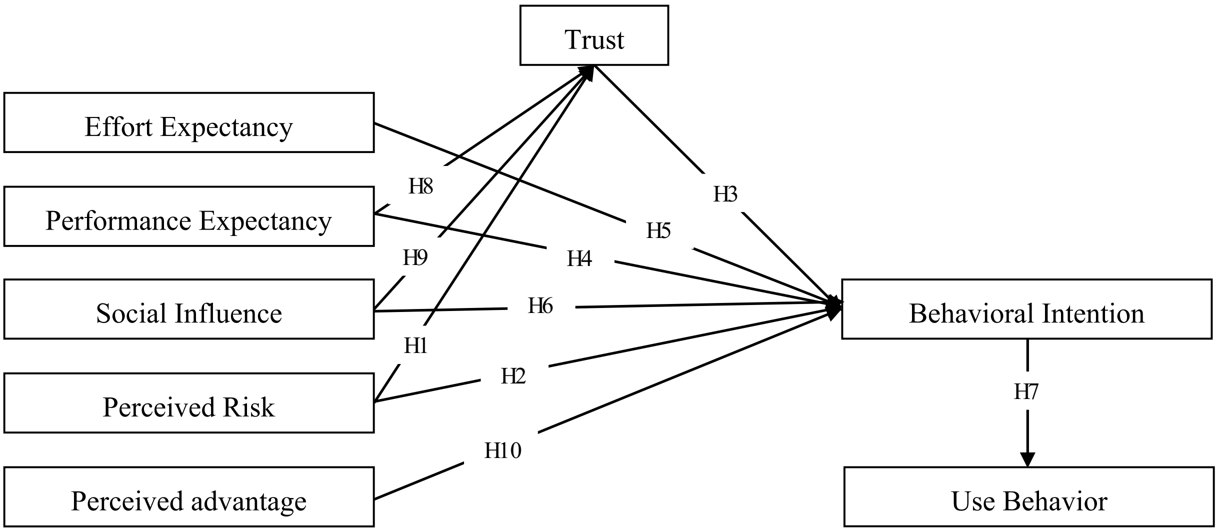

FIGURE 1
Theoretical model.

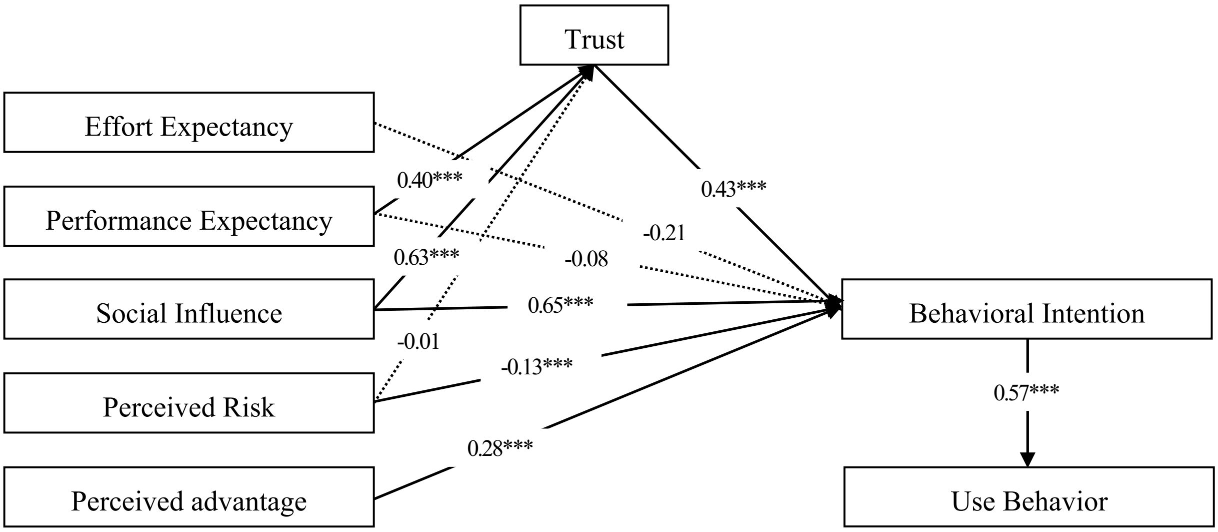

FIGURE 2
Path coefficients for the research model. ***p<0.001.

outlets and that more than half of digital banking users have a bachelor's degree or higher (iResearch, 2021). According to the statistics on the characteristics of the sample, males and females accounted for 53.5 and 46.5%, respectively, of the respondents, almost evenly distributed. The age groups of 18–30, 31–50, and 51–65 made up 58.7, 36.2, and 5.1%, respectively. In terms of education, 72.8% had a junior college or bachelor's degree, and 14.8% had a master's degree or above. In terms of occupation, the proportion of government officials and employees of enterprises and public institutions was 62.3%. In terms of the frequency of use, 29.9% of the respondents use these services 1–3 times a year, 58.9% use them 3 to 5 times a year, and 11.2% use them more than 5 times a year. In terms of the preference for financial service channels, 75.7% of the respondents preferred contactless channels, and 24.3% preferred offline channels. In addition, 81.5% of the respondents said they knew contactless financial services. The sample data were consistent with the actual situation, with representativeness and diversity, meeting the requirements of the study for sample characteristics.

4. Results of statistical analysis

The structural equation modelling (SEM) approach was used to validate the research model. We analyzed the generated hypotheses by using AMOS version 23.0. Based on the two-step approach recommended by Anderson and Gerbing (1988), this study first analyzed the measurement model to test the reliability and validity of

TABLE 1 Loadings and composite reliability.

Variables	Items	Loadings	Cronbach's α	AVE	CR
Performance expectancy	PE1	0.79	0.89	0.57	0.80
	PE3	0.68			
	PE5	0.79			
Effort expectancy	EE1	0.80	0.83	0.62	0.77
	EE3	0.78			
Social influence	SI1	0.77	0.85	0.57	0.84
	SI2	0.73			
	SI3	0.73			
	SI4	0.79			
Perceived risk	PR1	0.83	0.91	0.67	0.91
	PR2	0.86			
	PR3	0.82			
	PR4	0.77			
	PR5	0.82			
Perceived advantage	PA1	0.78	0.87	0.56	0.79
	PA2	0.70			
	PA3	0.75			
Trust	PB1	0.79	0.92	0.63	0.89
	PB2	0.83			
	PB3	0.79			
	PB4	0.81			
	PB5	0.75			
Behavioral intention	BI2	0.90	0.84	0.67	0.80
	BI4	0.73			
Use behavior	UB1	0.71	0.83	0.66	0.79
	UB3	0.90			

TABLE 2 AVEs and correlation coefficients of constructs.

	1	2	3	4	5	6	7	8
1.Performance expectations	0.76							
2. Effort expectancy	0.65	0.79						
3. Social influence	0.68	0.73	0.76					
4. Perceived risk	0.39	0.45	0.53	0.82				
5. Perceived advantage	0.69	0.64	0.72	−0.42	0.75			
6. Trust	0.64	0.57	0.67	−0.49	0.57	0.79		
7. Behavioral intention	0.71	0.68	0.69	−0.39	0.72	0.58	0.82	
8. Use behavior	0.55	0.69	0.68	−0.42	0.71	0.61	0.79	0.81

Diagonal figures are square root of AVE. **p*, 0.05; ***p*, 0.01; ****p*, 0.001.

the instrument, and then analyzed the structural model to test our research hypotheses (Bentler, 1989).

4.1. Measurement model analysis

To determine the reliability of each item, this study examined the significance and magnitude of its loadings. As shown in Table 1， all items loaded significantly on their respective latent factors, and they all achieved standardized loadings of at least 0.60. Two measures were used to assess the internal consistency of the constructs: composite reliability (CR) and average variance extracted (AVE). The CRs were in the range between 0.77 and 0.91, and the AVEs were in the scope from 0.56 to 0.67; therefore, all were above the recommended cut-off levels of 0.70 and 0.50, respectively, and revealed good internal consistency. In the validity analysis, the convergent validity was also examined through composite reliability.

The discriminant validity was measured by examining the average variance extracted (AVE). According to Fornell and Larcker (1981), the discriminant validity is demonstrated because the correlations between constructs are all below the square root of the AVE per construct. As shown in Table 2, no correlation coefficients between constructs exceed the square root of the AVE, which supports a satisfactory discriminant validity.

4.2. Structural model analysis

As the measurement model was acceptable, hypothesized relationships were tested by estimating the statistical significance of path coefficients for the structural model. From Table 3, it is found that $\chi 2$/df is 2.56, TLI value of 0.94， GFI value of 0.95, RFI value of 0.91, NFI value of 0.93, IFI value of 0.95, and RMSEA value of 0.06. Therefore, the model has a good fit.

Table 4 shows the results in the model testing is to examine the path significance of each hypothesis. The results showed that hypotheses H2, H3, H6, H7, H8, H9, and H10 had absolute CR values greater than 1.96 and *p*-values less than 0.05, indicating that they passed the significance test. Therefore, these seven hypotheses were supported. H1, H4, and H5 did not pass the significance level test and were thus not supported (Figure 2).

5. Discussion

This study further modified the UTAUT model based on the theories of trust, perceived risk, and perceived advantage and constructed a conceptual model to examine the influencing factors of the behavior of using contactless financial services. The model was validated using the data collected through questionnaires. The following conclusions were drawn.

The standardized path coefficient between perceived risk and behavioral intention was −0.13, and $p < 0.005$, indicating that perceived risk negatively influences the behavioral intention. Therefore, H2 was supported. The standardized path coefficient between trust and behavioral intention was 0.43, and $p < 0.001$, indicating that trust positively influences the behavioral intention. Therefore, H3 was supported. The findings are consistent with

TABLE 3 Validity factor analysis model fit.

Index name	χ^2/df	TLI	CFI	RFI	NFI	IFI	RMSEA
Index criteria	<3	>0.9	>0.9	>0.9	>0.9	>0.9	<0.08
Actual value	2.56	0.94	0.95	0.91	0.93	0.95	0.06

TABLE 4 Hypotheses testing results.

Path	Standardized path coefficient	S.E.	C.R.	*p*
H1: TRU ← PR	−0.01	0.03	−0.36	0.72
H2: BI ← PR	−0.13	0.04	−2.97	***
H3: BI ← TRU	0.43	0.10	4.25	***
H4: BI ← PE	−0.08	0.12	−0.62	0.53
H5: BI ← EE	−0.21	0.11	1.84	0.07
H6: BI ← SI	0.65	0.11	5.89	***
H7: UB ← BI	0.57	0.10	5.49	***
H8: TRU ← PE	0.40	0.06	6.49	***
H9: TRU ← SI	0.63	0.07	8.90	***
H10: BI ← PA	0.28	0.07	3.95	***

*$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$.

previous studies (Liu et al., 2020). When users have greater concerns about adverse consequences due to uncertainty when using contactless services, the use of this type of service is somewhat hindered. Contactless financial services in China have witnessed a rapid development since the pandemic. In order to block the transmission of the pandemic and protect citizens, the government has implemented several preventive and control measures. For example, public places were forced to close down. Therefore, business that needed to be handled on offline scenarios was switched to contact-free channels. In this context, many financial institutions, led by the banking industry, have made digital transformation and have completed channel conversion in a short time. However, at that time, risk management measures, laws and regulations related to contactless financial services were not perfect enough, which brought many potential risks. Lawbreakers also took advantage of the chaotic period of transformation to commit frauds, resulting in an increase in financial crime rate. Now that users needed to face increased risk of uncertainty when using contactless financial services, users were less willing to use the services in order to avoid relevant risks. Trust has a significant positive impact on the behavioral intention. Users show a greater intention to use contactless financial services when they have higher recognition of the validity of products and service information, user privacy protection, transaction environment, and security building provided by this type of service. This result is consistent with the conclusion about the relationship between trust and the behavioral intention drawn in the study on the impact of trust on users' online purchasing behavior by Wu et al. (2020), indicating that trust is also one of the important factors influencing use.

Both social influences and perceived advantages positively influence the behavioral intention, with standardized path coefficients of 0.65 and 0.28, respectively, and $p < 0.001$. Therefore, H6 and H10 were supported. It can be seen that users' intention to use something is greatly influenced by people around them and the social environment, which is consistent with the conclusion about social influence and the behavioral intention drawn in the study on users' acceptance of new technologies by Kumar et al. (2016). Users consider contactless financial services advantageous as more businesses can be dealt with online, and traditional offline channels have some problems such as a long waiting time and low efficiency. As a result, the overall satisfaction with contactless channels is significantly higher than that of traditional outlets. At present, as the pandemic still lingers, the use of contactless services not only meets users' demand for less contact but also conforms to the trend of social development. These services can improve user stickiness and have great potential for future development.

The standardized path coefficient between the behavioral intention and the use behavior was 0.57, and $p < 0.001$, indicating that the intention positively influences use behavior. Therefore, H7 was supported. This conclusion is consistent with that drawn by Venkatesh et al. When users show a great intention to use contactless financial services, they are more motivated to translate ideas and plans into action. Meanwhile, <the 2021 White Paper on Digital Banking in China>shows that most users have expectations for contactless financial services, and they are willing to use and recommend this type of service.

The standardized path coefficient between performance expectancy and trust and that between social influence and trust were 0.40 and 0.63, respectively, and $p < 0.001$. Therefore, H8 and H9 were supported. It indicates that during the process of building trust in contactless financial services, users are greatly affected by their expectations for related products and services, as well as by people around them and sociocultural norms. The advancement of Internet technology has promoted the development of social media and virtual communities online. As users' feelings about contactless financial services are spread through interpersonal relationships and social networks, positive comments on this type of service can strengthen users' trust.

The standardized path coefficient between perceived risk and trust was −0.01, and $p = 0.72$. Therefore, H1 was not supported, which is not consistent with previous studies. This is closely related to the particular context of the pandemic. The public spaces were closed under the pressure of the pandemic. The Chinese government launched policies to guide the banking sector to actively develop the contact-free finance. And educate the public on cyber security *via* official media accounts. According to the statistics of the China Banking Association, the market share of non-contact services of banking institutions reached 96% on average during the pandemic. It can be seen that under the sociocultural environment where the government and banks actively conduct public education and guidance, the public trust the government and banks at a high level. And are willing to believe that the products and services provided by the non-contact channel are safe, reliable and can be used for daily business needs. As digital technology develops, new types of network fraud frequently occur. To solve the problem, various departments actively spread relevant knowledge of network security and strengthen the protection of users' personal information and property security. In addition, users' network security awareness has been greatly enhanced as they have more experience in online behavior and contactless services. In such a context, they believe that their rights and interests are protected when using contactless financial services.

The standardized path coefficient between performance expectancy and the behavioral intention and that between effort expectancy and the behavioral intention were −0.078 and −0.21, respectively, and the *p*-values were 0.53 and 0.07, respectively. Therefore, H4 and H5 were not supported. During this special period of the pandemic, many offline venues shut down. The purpose of users is not to enhance their personal technology or performance through the use of contactless financial services but to handle necessary business in order to maintain the normal process of their work and life. Therefore, the influence of performance expectation on the willingness to use is not significant. In recent years, digital banking has been upgraded in three main aspects: system support, data management and user perception. Due to the pandemic, the banking industry attaches more importance to the construction of contactless financial business, allowing users to enjoy faster, simpler and more comprehensive contactless financial services, thus greatly improving the stability and usability of the contactless financial services system. According to the Statistic Report of on China's Internet Development, as of June 2022, the Internet penetration rate in China reaches 74.4%, with 99.6% of netizens using mobile devices. Through the analysis of the characteristics of the samples in this study, the preference users of contactless financial services are younger, and have higher education and better digital literacy, which greatly reduces their perceived technical difficulties when using contactless financial services. In recent years, digital banking has been upgraded mainly in three dimensions, namely system support, data management, and user perception. As users who prefer contactless channels are relatively young, it is not difficult for them to use digital technologies and communication devices. At the same time, as they are used to solving problems through online channels, the perceived usefulness and efficiency are greatly reduced.

6. Conclusion

This study analyzed the influence mechanism of the behavior of using contactless financial services and made the following suggestions on how to develop contactless financial services and increase users' intention to use these services, in a bid to accelerate the rollout of contactless financial services and enhance their influence.

Further improving the ability to collect and integrate information and providing personalized services. Platforms offering contactless financial services should follow the development of digital technology, make full use of 5G, big data, cloud computing, and other technologies to further improve the ability to collect mass data and conduct data mining, and establish user profiles. Based on the analysis of user profiles, personalized content recommendations are integrated to meet user needs and improve the efficiency of users' acquisition of information.

Laws and regulations in contact-free scenarios should be improved to create a safe transaction environment. On the one hand, relevant government departments need to improve the relevant laws and regulations governing transactions and services conducted on the basis of contact-free scenarios as soon as possible, in order to clarify the rights and obligations of both parties to the transactions. On the other hand, through the introduction of block chains and other technologies, the risk prevention and control capability of non-contacted scenarios shall be enhanced, to reduce system risks and strengthen the stability of system operation.

It is necessary to establish a comprehensive mechanism to protect the user privacy and increase user willingness to use contactless financial services. In the process of users involving in contactless financial services, the collection and use of users' information by service providers should be severely regulated. By ensuring the openness and transparency of information collection and use, and effectively protecting user information and property security, service providers can reduce cyber risks and increase users' confidence in using the service.

Refining the policies and regulations in the digital environment and creating a safe transaction environment. On the one hand, relevant government departments should accelerate the formulation of laws and regulations related to financial products and services on the Internet to protect the legitimate rights and interests of users while spreading knowledge about network fraud and stepping up users' precautions. On the other hand, platforms offering contactless financial services can strengthen the protection of users' information by introducing technologies such as blockchain to reduce users' risks while ensuring strict compliance with transaction service commitments during operations.

Relevant government departments and financial institutions should promote and guide the rollout of contactless financial services in a planned and organized manner. Nowadays, China is vigorously promoting digitization, and the development of contactless financial services is in line with the national demand. Against such a backdrop, it is advisable to make the most of the favorable policy environment, strengthen the promotion and publicity of enterprises, focus on brand building, and optimize the effects to continuously improve users' trust in contactless financial services and their intention to use these services. Meanwhile, as large numbers of young are using contactless financial platforms, the platforms should further simplify the interface settings and operation processes to meet the needs of different people and enhance the influence of their services.

This study has some shortcomings. First, in terms of the measurement of the behavioral intention and use behavior, four items were initially designed to measure the two constructs, but only two were retained given factors such as the factor analysis and Cronbach's alpha. With the advancement of digital technologies, the increasing popularity of mobile devices, and the improved digital literacy of users, it has become much easier to download and use contactless services. All these factors have resulted in an unclear understanding of the differences between the two constructs. Future research should explore the measurement scales for the two constructs in the digital environment. Second, in the age distribution of the samples, young people aged 18–30 account for nearly 60%, and they are the main users of non-contact services. At present, with the strategic goal of building digital China strategy and national cyber development strategy, diverse industries are speeding up the pace of digital transformation. Digital technologies penetrate every aspect of people's life. However, there is a huge gap in the digital literacy and technological level of different regions and groups in China. In order to further expand the audience and impact of contact-free services, differentiated and digitally inclusive services should be provided according to the specific needs of different groups. Finally, as the pandemic situation eases, life and work order is gradually restored, but in the process of fighting against COVID-19, the way of human life and work has been already changed, and the non-contact economy has emerged as a dark horse. In the post-pandemic era, the contact-free economy will continue to exist as an economic innovation. It will also play an important role in the transformation of industrial and economic structures across the globe. Therefore, we should continue to pay attention to the development of new technologies and users' technology adoption behavior in the contactless economy in the future.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

LC constructed the theoretical framework and research model for this study. JJ designed the questionnaire and completed the data analysis. CW summarized the references and made recommendations. All authors approved the final version of the manuscript for submission.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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