Investigating college students' green food consumption intentions in China: integrating the Theory of Planned Behavior and Norm Activation Theory

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Introduction: The global trend toward consuming green food is on the rise. College students, as the future consumer base, have sparked significant interest in their inclination toward consuming environmentally-friendly foods. This paper integrates the Theory of Planned Behavior with the Norm Activation Theory to investigate the factors influencing college students' propensity to choose green foods, establishing a comprehensive model.

Methods: This study utilized online and paper questionnaires for data collection, distributing them among college students and receiving 350 valid responses. In the data analysis phase, SPSS was employed for statistical data analysis, including descriptive statistics and regression analysis, while AMOS was used for structural equation modeling.

Results and discussion: The data analysis results indicate that subjective norms, behavioral attitudes, and individual norms have a significant positive influence on college students' inclination to purchase green food. Purchase intention is indirectly influenced by personal norms and behavioral attitudes through perceptions of consequences. Responsibility attribution indirectly impacts purchase intention of green food through personal norms. Personal norms are indirectly influenced by responsibility attribution through perceptions of consequences.

KEYWORDS

green consumption, green food, willingness to consume, Theory of Planned Behavior, Norm Activation Theory

1 Introduction

With the rapid development of society, consumers are particularly concerned about food health issues (Afshin et al., 2019; Garcia et al., 2020). Green food, with its sustainable and health-promoting features, is seen as an effective solution for food safety and sustainable development concerns. The prolonged consumption of conventional foods containing chemical residues poses health risks, potentially exacerbating chronic conditions and increasing cancer rates (John and Babu, 2021). Consequently, there is a growing preference among consumers for green and healthy foods with minimal chemical residues (Cardello, 1995; Savelli et al., 2019). Fundamentally solving the above problems requires shifting from reliance on traditional food consumption patterns to sustainable ones (Jackson, 2008; Vermeir et al., 2020). In this transformation, the role of China, one of the world's largest food markets, cannot be ignored (Wang and Zhao, 2022). The current

monolithic structure and low value-added characteristics of China's green food industry fail to meet the rapidly growing demand within the domestic market for diversified and high-quality green health foods (Sun et al., 2021). Therefore, encouraging Chinese consumers to buy green food has far-reaching practical significance for complying with the new trend of healthy consumption.

Understanding consumers' green consumption intentions is crucial for promoting the consumption of green food. The research and development of consumer green behavior can be roughly divided into two stages. In the early days, scholars mainly analyzed differences in demographic characteristics such as gender, age, income, occupation and education level of consumers. For example, some research found that young, wealthy men with young children and living in small families are more willing to buy green food (Liu et al., 2016). University professors and administrators who have received higher education have also shown a strong interest in green food (Hansmann et al., 2020). However, some studies have also shown that the correlation between these demographic characteristics and consumer green consumption behavior is weak. As research deepens, scholars gradually shift their focus to the impact of psychological, cognitive, and external factors on consumer green consumption behavior. Scholars have introduced these in-depth factors to study consumer green consumption behavior, making the research results more interpretive (Luo et al., 2023). The research on consumer green consumption willingness is still evolving, therefore requiring a large number of contributions from different countries and regions.

Current research on consumer willingness toward green food consumption often centers around developed countries. Notably, in the United States, studies and practices within the realm of green consumption have matured significantly. The research suggests that leveraging consumer psychology plays a crucial role in boosting consumer willingness, a key factor enabling the United States to achieve an annual consumption amounting to as high as $250 billion (Maniatis, 2016). Moreover, developed countries demonstrate greater innovation and diversity in research methods, placing a stronger emphasis on interdisciplinary integration, particularly in the cross-application of neuroscience and psychology (Leeuwis et al., 2022). By employing advanced technological methods such as functional magnetic resonance imaging (fMRI; Vezich et al., 2017) and eye-tracking devices (Ruppenthal, 2023). Localized research on green food consumption tailored to Chinese market needs is essential. Current research focuses on areas like low-carbon transportation and energy-efficient homes, neglecting green food consumption and specific demographics. University students, potential leaders in green consumption, warrant more research on their willingness to consume green food and influencing factors.
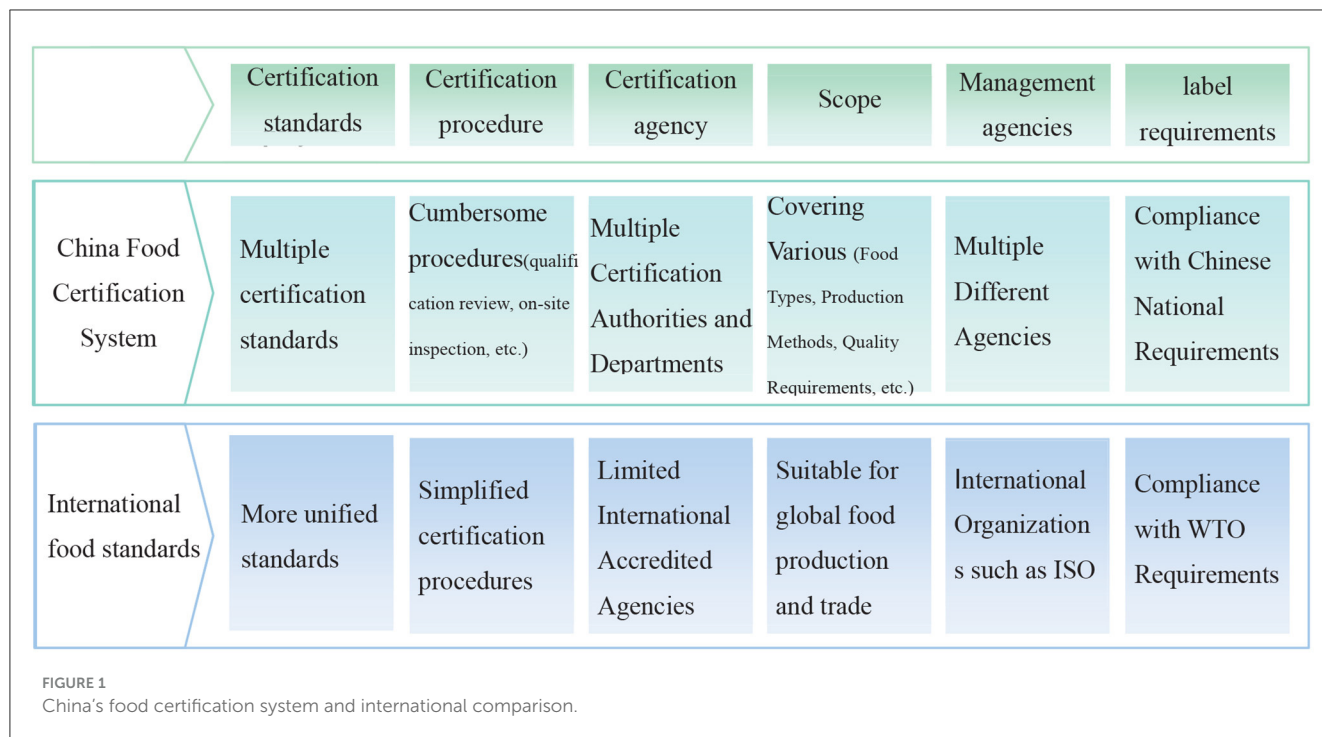
University students constitute a core part of the country's future high-quality workforce, and their health status is crucial for the nation's sustainable development. According to the "China Green Consumption Report," university students are pioneers in green consumption, as their youth and educational background make them more receptive to and capable of spreading green concepts (National Development and Reform Commission, 2023). Data suggests that university students typically exhibit strong environmental awareness and values toward sustainable

consumption, showing a willingness to pay higher costs for environmental conservation. They are at a critical stage in value formation and social responsibility development, with their consumption choices easily influenced by peers, educational environment, and societal norms. In China, university students' group life is centered around classes and dormitories, making them particularly susceptible to peer norms in their consumption behavior. Moreover, findings from the economics laboratory indicate that student samples exhibit a degree of universality (Zhen et al., 2024). Using university students as research subjects is highly representative and valuable for reference. Studying this group can help in better understanding and guiding the willingness of high-quality consumers to engage in green food consumption behaviors.

China's green food system is designed to ensure the safety and environmental sustainability of food products. It provides clear standards and a grading system to guide producers and consumers. Given that the quality of many food products in China may differ from international standards, the Chinese government has implemented a food certification system that is tailored to the country's production and consumption patterns (Figure 1). The food production certification standards in China are divided into three levels: pollution-free food certification, green food certification, and organic food certification (Table 1). Compared to organic food, the concept of green food is broader and encompasses reducing the use of plastic packaging, promoting sustainable production and consumption, and other environmental practices (Zhu et al., 2013). Green food focuses on minimizing environmental impact during production, such as reducing pollution to soil, water sources, and ecosystems, as well as cutting energy and resource consumption. There are two levels of green food certification: Grade A allows limited use of certain chemical synthetic substances, while AA-grade prohibits the use of any harmful chemicals.

This research offers two key contributions. Firstly, it delves into the green food consumption willingness among Chinese university students. Despite numerous studies on Chinese university students, most focus on areas like educational and cultural entertainment consumption. Secondly, the innovative fusion of theoretical frameworks. This study innovative integrates the Theory of Planned Behavior (TPB) and the Norm Activation Theory (NAT), constructing a more comprehensive explanatory framework. These two theories complement each other, with TPB focusing on the formation of behavioral intentions, while NAT emphasizes the internalization of moral norms. This framework amalgamates the strengths of both theories, delving deeply into the combined influence of individual attitudes, subjective norms, perceived behavioral control, as well as the activation of moral and social norms on consumer decision-making. While previous research predominantly relied on TPB, with relatively less application of NAT, this study adeptly addresses this research gap. By analyzing six key factors—behavioral attitudes, subjective norms, consequence perception, responsibility attribution, and individual norms study comprehensively elucidates the psychological and Purchase Intention decisions of green food among university students.

The remaining parts of this study are arranged as follows: the second part is the theoretical basis and research hypotheses,

	Certification standards	Certification procedure	Certification agency	Scope	Management agencies	label requirements
China Food Certification System	Multiple certification standards	Cumbersome procedures (qualification review, on-site inspection, etc.)	Multiple Certification Authorities and Departments	Covering Various (Food Types, Production Methods, Quality Requirements, etc.)	Multiple Different Agencies	Compliance with Chinese National Requirements
International food standards	More unified standards	Simplified certification procedures	Limited International Accredited Agencies	Suitable for global food production and trade	International Organizations such as ISO	Compliance with WTO Requirements

FIGURE 1
China's food certification system and international comparison.

combining relevant theories to propose research hypotheses and construct a research model; the third part is the research design, explaining the data sources and research variables; the fourth part carries out the empirical analysis; Finally, the conclusions of our study are discussed.

2 Research hypotheses

2.1 Theory of Planned Behavior and hypotheses

The TPB is one of the most mature theories in the field of social psychology (Conner and Armitage, 1998). According to this theory, the most reliable predictor of an individual's behavior is his or her willingness to act, and an individual's willingness to act will be affected by psychological factors such as behavioral attitudes and subjective norms. For college students, their willingness to consume green food will directly determine their actual possibility of purchasing green food. Many studies have successfully used TPB to predict food choices. For example, Dowd and Burke (2013) applied the TPB in their study and found that attitudes and subjective norms accounted for a large portion of the variance in willingness to purchase sustainably sourced food. Kang et al. (2013) research found that behavioral attitudes and subjective norms have a positive impact on young consumers' willingness to purchase sustainable clothing in different countries. Specifically, behavioral attitude refers to an individual's positive or negative evaluation of a certain behavior. Regarding green food consumption, if college students believe that purchasing green food is beneficial, valuable, and consistent with their own values, then they will form a

more positive behavioral attitude and be more inclined to have a willingness to purchase green food.

Subjective norms reflect an individual's perception of others' expectations and their motivation to meet these expectations. The consumption intention of college students reflects the emphasis on personal social identity, and is also affected by the online environment and peers, showing the characteristics of pursuing fashion trends and following the herd mentality (Chen, 2021). Subjective norms have a dominant influence on college students' consumption intentions, and consumption attitudes also have a certain influence (Qu et al., 2022). Studies by some scholars have shown that low-carbon awareness, environmental responsibility and consumption habits are the main factors affecting college students' low-carbon consumption intentions (Wang and Yao, 2023). For college students, their educational environment and peer groups may form a social norm of green consumption and have a greater impact on them. If college students perceive that important others such as family, friends, and school want them to buy green food, and they are personally willing to act to meet these expectations, their willingness to consume green food will increase accordingly. Therefore, subjective norms are also a key factor affecting college students' willingness to consume green food.

In summary, according to the TPB, the two key psychological factors, behavioral attitude and subjective norms, will have a significant positive impact on college students' willingness to consume green food. Accordingly, this article puts forward the following hypotheses:

H1: Behavioral attitude has a positive impact on college students' willingness to buy green food.

H2: Subjective norms have a positive impact on college students' willingness to purchase green food.

TABLE 1 China food certification system.

	Pollution-free food	Green food	Organic food
Certification standard	Complies with national pollution-free food standards	Complies with national green food standards	Complies with national organic food standards
Production method	Reduces or prohibits the use of pesticides and chemical fertilizers	Adopts ecological agricultural techniques, reducing the use of chemicals	Prohibits the use of chemically synthesized substances, following the natural cycle
Certification scope	All foods	Some foods (such as agricultural products, livestock products, aquatic products)	All foods
Certification body	National Pollution-free Food Certification Management Center	China Green Food Development Center	China Organic Food Certification Center
Certification cycle	1–3 years	1–3 years	1 year

2.2 Norm Activation Theory and hypotheses

NAT is a behavioral theory proposed by Schwartz (1977) to explain and predict individual prosocial behavior. When applying NAT to explain a series of pro-social and pro-environmental behavioral intentions, it was found that the relationship between awareness of consequences, attribution of responsibility, individual norms and behavioral intentions is a chain mediation model, that is, perception of consequences will activate individuals through attribution of responsibility. Norms, individual norms lead to individual pro-social and pro-environmental intentions (Steg and De Groot, 2010). Zhou and Zhang (2020) research confirmed the positive relationship between perception of consequences, attribution of responsibility, individual norms and green purchase intention. College students are in a critical period of forming values and cultivating social responsibility awareness, and their behavior is more easily affected by normative factors (Li et al., 2024). When college students clearly perceive the environmental protection effects of purchasing green food, they are more likely to associate these positive consequences with their own responsibilities. In other words, college students will believe that they have the responsibility to contribute to environmental protection through green food consumption. This kind of consequence perception promotes responsibility attribution, which helps to explain the formation mechanism of college students' green food consumption behavior. When college students internalize this kind of responsibility attribution, they are more likely to internalize green food consumption as their own personal norms and moral standards, thereby forming individual norms that support green consumption. Therefore, college students' responsibility attribution will have a positive impact on their individual norms. Secondly, internalized individual norms will eventually be transformed into important motivations for behavioral intentions. For college students, if they have formed personal norms that support green food consumption, their willingness to consume green food will increase accordingly. This is because the personal norms and moral standards that college students internally identify with will directly lead to their willingness to buy green food.

Accordingly, this study proposes these hypotheses for the college student population:

H3: When consuming green food, consequence perception has a positive impact on responsibility attribution.

H4: In the process of green food consumption, perception of consequences has a positive impact on individual norms.

H5: In the process of green food consumption, responsibility attribution has a positive impact on individual norms.

H6: In the consumption and purchase of green food, individual norms have a positive impact on college students' willingness to purchase green food.

2.3 Variable relationship between Theory of Planned Behavior and Norm Activation Theory

The TPB behavior takes the self-interest of individual behavior as the starting point and regards maximizing self-interest as the basic principle of individual behavioral decision-making. However, NAT emphasizes the altruistic tendency existing in individual behavior and uses the individual's sense of moral obligation as the motivation for altruistic behavior (Klöckner and Ohms, 2009). Panda et al. (2020) argues that an increased awareness of sustainability positively influences consumers' altruistic behavior, leading to higher purchase intention, loyalty to green brands, and communication about green brands. Therefore, studying green purchasing behavior only from a self-interested perspective will ignore the impact of individual altruistic motivations on consumers, and will not provide a comprehensive and in-depth understanding of consumers' willingness to purchase green food. According to research by Teisl et al. (2009), an individual's behavioral norms may be affected by subjective norms, which refers to an individual's perception of the opinions and evaluations of his or her behavior by important people and groups. Individuals will use these opinions and views to judge whether their behavior is in line with society's expectations, and thus decide whether it is consistent with their own inner expectations and values. A framework integrating the TPB and NAT can help improve the ability to predict and explain environmental behavior. Maichum et al. (2016) proposed that beliefs, societal norms, and perceived behavioral control strongly influence the inclination
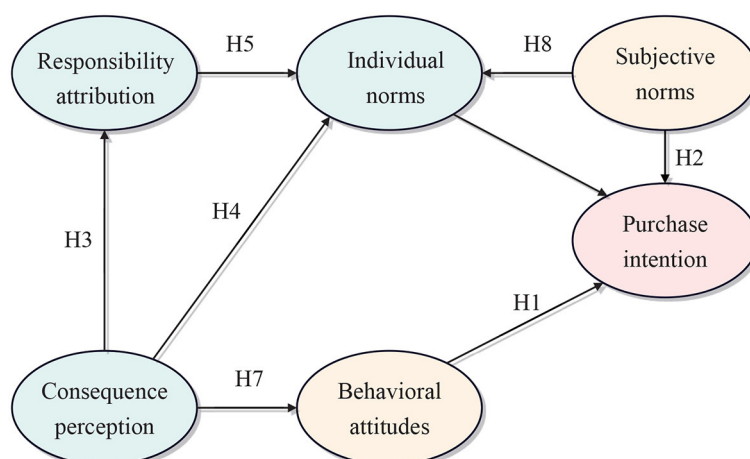
FIGURE 2
Model of the influence of college students' green food consumption intention.

to purchase green items. Additionally, it was discovered that consumers' purchase intention was most highly impacted by their attitude. Environmental knowledge has a significant positive impact on attitudes and subjective norms about green products. Behavioral attitude is the consumer's view and evaluation of his or her purchasing behavior, which reflects the consumer's overall understanding of his or her purchasing behavior. Consequence awareness is the consumer's understanding of the impact of behavioral results, which will inevitably affect the attitude toward a specific behavior. As a result, the subsequent hypotheses are formulated for this study:

H7: In the consumption process of green food, the perception of consequences has a positive impact on behavioral attitudes.

H8: Regarding the consumption of green foods, individual norms are positively influenced by subjective norms.

The research paradigm in this article is depicted by the framework diagram displayed (Figure 2).

3 Research design

3.1 Variable definition

The article introduces a theoretical framework consisting of six variables, wherein each variable is assessed utilizing Likert scales featuring five levels—"strongly disagree" to "strongly agree." The measuring questions utilized in this study of green food purchase intention have been extensively adapted from established scales utilized in prior research and are detailed in Table 2. All variables are assessed using these inquiries.

3.2 Data sources

This study gathered data through both online and offline surveys targeting college students across multiple universities in China. The offline survey served as a preliminary study to verify the questionnaire's effectiveness, while the online version aimed to expand the size and diversity of the sample. Out of 420 collected questionnaires, 350 were deemed valid after excluding responses from those who had never purchased green food, as well as incomplete or improperly filled entries, achieving a validity rate of 0.833.

A pilot survey was conducted at a university in Xi'an, Shaanxi province, to assess the appropriateness of the question setup and respondents' comprehension following the initial questionnaire draft. Feedback indicated that while the main indicators and the questionnaire length were appropriate, the excessive use of technical terms led to confusion or vague answers. Consequently, modifications were made to clarify or simplify complex descriptions, enhancing the questionnaire's validity and scientific integrity.

The college student population is often regarded as a microcosm of society, and their economic behaviors are widely representative. A study published in the journal Nature suggests that student samples are appropriate for investigating many social behaviors, as they exhibit similar behavioral patterns to non-student groups in these aspects (Exadaktylos et al., 2013). Additionally, experimental evidence indicates that the neural activities and physiological responses displayed by college students during the food selection process are highly similar to those of other populations, reflecting a universal biological basis (Gómez-Carmona et al., 2021). This provides a typical sample group for studying the physiological mechanisms of consumer behavior. In terms of food preferences, visual attention, and other aspects of consumer decision-making, college student consumers also exhibit representative psychological characteristics in their physiological mechanisms of food behavior (Robinson et al., 2015). These findings collectively emphasize the importance of the college student population in studying consumer behavior, particularly in exploring the physiological and psychological mechanisms underlying food consumption decisions.

To ensure the data possessed extensive representatives, a geographically balanced distribution approach was adopted,

TABLE 2 Definition and description of variables.

Variable	Code	Item	References
Behavioral attitude (A)	A1	Do you think buying green food is a good idea?	Van de Velde et al., 2009
	A2	In your experience with food consumption, do you believe that opting for green food is a prudent decision?	
	A3	Do you believe that consuming green food can help protect the environment and promote sustainable development?	
	A4	Are you sincerely satisfied with your green food consumption experience?	
Subjective norms (B)	B1	Do your relatives and friends approve of buying green food?	Ha and Janda, 2012
	B2	Do your relatives and friends often buy green food?	
	B3	Are your friends and relatives satisfied after buying green food?	
	B4	Do your friends and family want you to buy green food?	
Consequence perception (C)	C1	Producing unsustainable food causes serious pollution and damage to the environment	Yeung and Morris, 2006
	C2	Unsustainable food produces high energy consumption and high carbon emissions, and causes environmental pollution	
	C3	Producing unsustainable food endangers the health of surrounding residents	
	C4	The subsequent processing of non-sustainable food will pollute the environment	
Responsibility attribution (D)	D1	Consumers share varying degrees of responsibility for the environmental and social challenges stemming from the production and consumption of green food	Joanes, 2019
	D2	Every consumer bears some responsibility for the ecological degradation and environmental damage caused by the food industry	
	D3	Consumers bear responsible for environmental issues stemming from the manufacturing of unsustainable food.	
	D4	As consumers, we should take some responsibility for reducing the production of unsustainable foods	
Individual norms (E)	E1	I feel obligated to play a role in mitigating the issue of unsustainable food contamination	Nair and Little, 2016
	E2	Everyone has an obligation to consider the impact on the environment when choosing food	
	E3	My values will lead me to choose to buy more green food	
	E4	Over consumption of non-sustainable foods makes me feel guilty	
Purchase Intention (F)	F1	I am pleased to purchase green food.	Rausch and Kopplin, 2021
	F2	I intend to purchase a greater amount of green food in the future.	
	F3	In the future, I shall persist in selecting environmentally-friendly meals.	
	F4	I am eager to suggest eco-friendly food choices to my family and friends.	

thoroughly encompassing East, Central, and West China. The questionnaire was distributed across Zhejiang University, Huazhong University of Science and Technology, Shaanxi Normal University, and Xi'an Jiaotong University. This approach facilitates a thorough exploration of the ways in which cultural and economic contexts in various regions influence the consumption preferences for green food.

The questionnaires were distributed from November to December 2023. Considering the large number of questions in the formal survey questionnaire, in order to ensure the quality and authenticity of the responses, we first set screening questions about purchasing behavior before the questionnaire to exclude participants who did not have relevant consumption experiences. Secondly, in the formal questionnaire, we designed reverse questions and screening questions to identify respondents who

did not answer seriously. Among the 350 respondents surveyed, 187 were male, while 163 were female. With regard to the purchasing habits of green foods, 209 respondents indicated that they frequently buy such products. As for expenditure on green foods, 13 respondents reported that they have no spending in this category, whereas another 44 respondents have expenditures on green foods that approach or exceed the majority of their total food spending.

3.3 Common method variation test

Considering that the research data of this article comes from an online questionnaire survey platform and adopts a self-reported

TABLE 3 SEM model fitness test.

Indicator	Standard	Results
CMIN/DF	1–3 is excellent, 3–5 is good	1.863
RMSEA	<0.05 is excellent, <0.08 is good	0.05
GFI	≥0.9 is excellent, >0.8 is good	0.973
RFI	>0.9 is good, >0.8 is good	0.936

response method, which may lead to common method variance (CMV) in the test results and thus affect the validity of the research results, the sample data is therefore Common method variation is controlled and tested (Harris et al., 2016). In the process of collecting sample data, this study procedurally controlled common method bias by taking measures such as anonymity, topic selection, and some reverse projects. In testing the common method variation of the sample data, this article adopts Harman's single factor test method and uses SPSS25.0 to conduct factor analysis on all scale items. The results indicate that the eigenvalues obtained from unrotated exploratory factor analysis are higher than There are seven factors of one (more than 1), and the greatest factor explains 0.398 of the variance, suggesting minimal common technique.

4 Empirical analysis

By utilizing maximum likelihood estimation in conjunction with structural equation modeling, this research paper empirically examines the proposed research hypotheses and explores the moderating effects. The statistical procedures were conducted using SPSS version 25.0 and AMOS version 26.0 software tools.

4.1 Measurement model test results

This article uses AMOS26.0 to conduct confirmatory factor analysis on the measurement model of the model to test the validity of the scale. Scholars unanimously agree that the Chi-square degrees of freedom ratio is a key indicator for assessing the goodness-of-fit of structural equation models. A CMIN/DF value ranging between 1 and 3 is considered indicative of a satisfactory model fit (Wen et al., 2004). An RMSEA value below 0.05 is considered excellent for approximation accuracy. Other fitness indicators (GFI, etc.) preferably >0.9 (Wen et al., 2005). The actual measurement results of the model show that the various fitting indicators of the measurement model are shown in the figure (Table 3). The validation of the green food consumption intention scale for college students revealed an KMO measure of 0.925, exceeding the commonly accepted threshold of 0.7, indicating suitable factor analysis suitability. Furthermore, the Bartlett's test of spherical yielded an approximate chi-square value of 9,096.991, which was statistically significant at $p < 0.001$, suggesting the appropriateness of performing factor analysis on the correlation matrix. The CMIN/DF of this scale is 1.863, the RMSEA is 0.05, the GFI is 0.973, and the RFI is 0.936. The values all meet the labeling of the fitness test. Therefore, the model fit of confirmatory factor analysis is good and further factor analysis can be conducted.

Each dimension's internal consistency was assessed using the Cronbach's coefficient reliability test method. The Cronbach's coefficient of the total scale and the coefficients of behavioral attitude, subjective norms, consequence perception, responsibility attribution, individual norms, and purchase intention are 0.922, 0.944, 0.936, 0.941, 0.931, 0.928, and 0.935, respectively. The Cronbach's alpha coefficients for the scale employed in this study range from 0.922 to 0.944, which are well above the generally accepted threshold of 0.7, signifying an excellent level of internal consistency among the items in the scale.

The study will analyze the convergent validity (AVE) and composite reliability (CR) of each scale dimension to assess model fit and ensure consistency, as shown in Table 4. This assessment involves a detailed examination of the standardized factor loadings of the items corresponding to their constructs within the structural equation modeling (SEM) context. Following this, the convergent validity and composite reliability criteria for each construct will be determined by employing recognized methods to estimate CR and AVE for the underlying constructs. This meticulous process allows for a comprehensive evaluation of the measurement model's reliability and validity, providing insights into the robustness of the scale in capturing the underlying constructs accurately. The analysis findings from Table 5 demonstrate that the factor loadings of the variables associated with each question surpass the threshold of 0.7. This observation underscores the scale's robustness in capturing the intended constructs effectively, thereby affirming its validity. The consistency and strength of these factor loadings signify the scale's ability to accurately measure the underlying model variables, reinforcing the credibility of the measurement tool in assessing the targeted phenomena. Overall, these results validate the scale design and underscore its capacity to adequately reflect the specified model variables, thereby enhancing the trustworthiness and utility of the measurement instrument in empirical research. The CR values all reached above 0.7, indicating that the question options highlighted the characteristics of the dimensional construct and had good internal consistency. The AVE values for each dimension, as determined by convergent validity testing, varied between 0.75 and 0.802. This indicates that all values surpassed 0.5. This shows that the overall convergent validity is good and the inherent quality of the model presupposed in this article is ideal. Combined with the above data analysis and comprehensive explanation, each dimension of this model has good convergent validity and combined reliability.

The discriminant validity of the scale is further confirmed by comparing the square root of AVE for each latent variable with the absolute value of the correlation coefficient between its row and column in Table 5. The research shows that the AVE values are higher than the correlation coefficients, indicating that the scale efficiently differentiates between the latent variables and displays strong discriminant validity. The disparity between the AVE and correlation coefficients underscores the unique contribution of each latent variable to the overall measurement model, reinforcing the scale's capacity to differentiate between the underlying constructs accurately. These results strengthen the credibility of the scale in capturing distinct dimensions of the phenomenon under study and highlight its efficacy in ensuring the validity and reliability of the measurement instrument in empirical research.

TABLE 4 An assessment of the convergent validity and combined reliability of the green food consumption intention scale across all its dimensions among college students.

Construct	Title	Factor loading	AVE	CR	Cronbach alpha
Behavioral attitude (A)	A1	0.947	0.787	0.936	0.944
	A2	0.869			
	A3	0.875			
	A4	0.854			
Subjective norms (B)	B1	0.900	0.782	0.935	0.936
	B2	0.860			
	B3	0.881			
	B4	0.895			
Consequence Perception (D)	D1	0.943	0.802	0.942	0.941
	D2	0.896			
	D3	0.881			
	D4	0.861			
Responsibility attribution (E)	E1	0.919	0.772	0.931	0.931
	E2	0.888			
	E3	0.871			
	E4	0.835			
Individual norms (F)	F1	0.91	0.750	0.923	0.928
	F2	0.876			
	F3	0.855			
	F4	0.821			
Purchase intention (G)	G1	0.923	0.762	0.928	0.935
	G2	0.870			
	G3	0.842			
	G4	0.855			

TABLE 5 Incorporate the square root of the average variance extracted (AVE) and correlation coefficients.

	AVE	Behavioral attitude	Subjective norms	Consequence perception	Responsibility attribution	Individual norms	Purchase intention
A	0.802	0.896					
B	0.782	0.000	0.884				
C	0.931	0.447	0.000	0.965			
D	0.923	0.356	0.276	0.318	0.961		
E	0.787	0.446	0.000	0.200	0.159	0.887	
F	0.928	0.211	0.358	0.129	0.346	0.336	0.963

Behavioral attitude (A); Subjective norms (B); Consequence Perception (C); Responsibility attribution (D); Individual norms (E); Purchase Intention (F).

## 4.2 Analysis of structural model verification results

Building upon the structural model, this paper examines the research hypotheses, with the results presented in Table 6. The analysis revealed that the impact of behavioral attitude on purchase intention, with an estimate of 0.314, a standard error of 0.301,

and significant p-value, significantly supports the proposed positive influence, thus confirming hypothesis H1. Hypothesis H2 was confirmed by the significant positive effect of subjective norms on purchase intention, as indicated by an estimate of 0.281, a standard error of 0.299, and a significant p-value. Furthermore, the influence of consequence perception on responsibility attribution was significant, with an estimate of 0.425, a standard error of

TABLE 6 Incorporate the square root of the average variance extracted (AVE) and correlation coefficients.

Path relationship	Unstd.	S.E.	C.R.	P	Std.	Whether to support
C → D	0.425	0.053	8.074	***	0.447	YES
D → E	0.208	0.061	3.386	***	0.198	YES
B → E	0.254	0.048	5.314	***	0.276	YES
C → E	0.266	0.058	4.571	***	0.267	YES
C → A	0.433	0.053	8.142	***	0.446	YES
B → F	0.281	0.05	5.664	***	0.299	YES
A → F	0.314	0.054	5.878	***	0.301	YES
E → F	0.220	0.054	4.047	***	0.216	YES

Behavioral attitude (A); Subjective norms (B); Consequence Perception (C); Responsibility attribution (D); Individual norms (E); Purchase Intention (F). *P*-value is <0.01, marked as***.

FIGURE 3
Path analysis diagram.
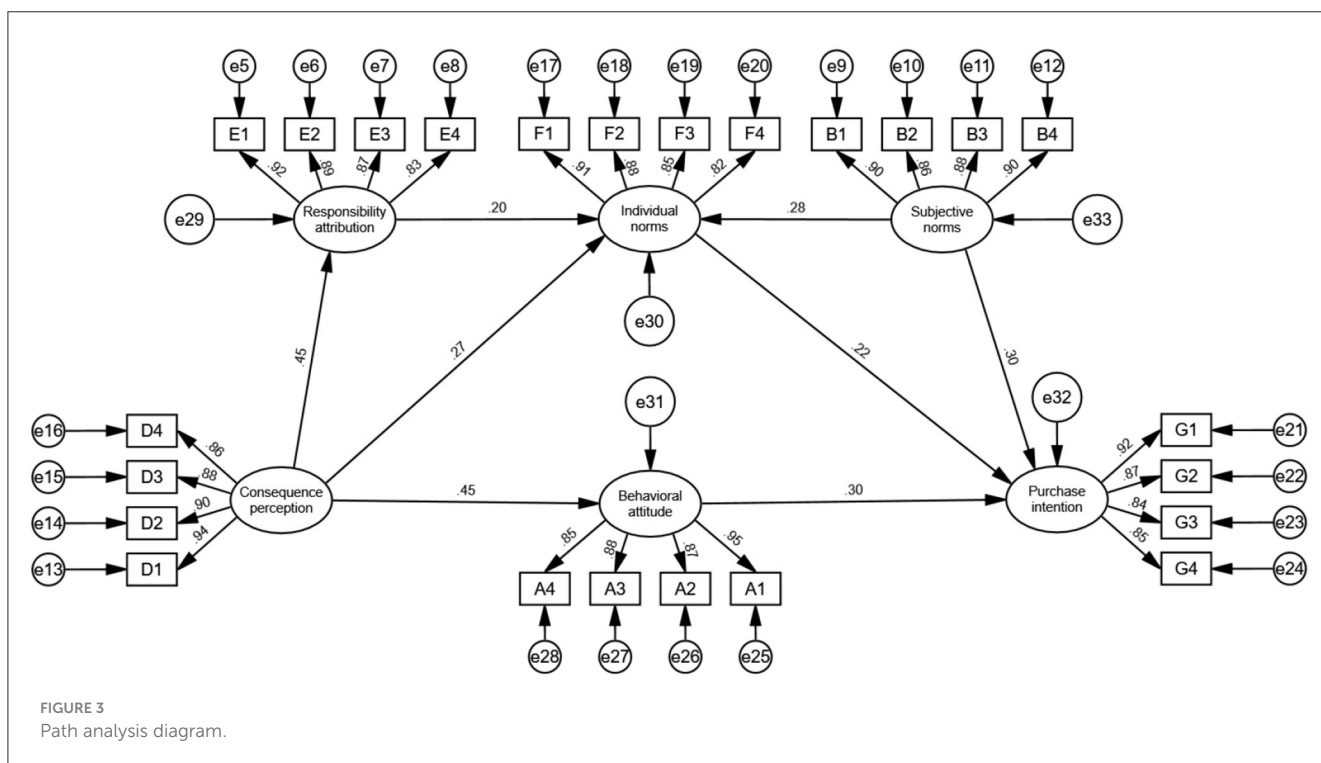
0.447, and a significant *p*-value, validating hypothesis H3. The impact of seeing consequences on individual norms was statistically significant, with an estimated value of 0.266, a standard error of 0.267, and a significant *p*-value, confirming hypothesis H4. The estimated value of responsibility attribution on individual norms is 0.208, the standard error value is 0.198, and the *p*-value is significant, indicating that responsibility attribution has a significant positive impact on individual norms, verifying hypothesis H5 path. The positive impact of individual norms on purchase intention was significant, with an estimate of 0.22, a standard error of 0.216, and a significant *p*-value, endorsing hypothesis H6. The relationship between consequence perception and behavioral attitude was significantly positive, as indicated by an estimate of 0.433, a standard error of 0.446, and a significant *p*-value, confirming hypothesis H7. Lastly, subjective norms were found to significantly influence individual norms, with an estimate of 0.254, a standard error of 0.276, and a significant *p*-value,

supporting hypothesis H8. The overall structural equation path analysis results of this article are in Figure 3.

5 Discussion

Research on consumer behavior, particularly analyzes focusing on willingness to pay for organic food, has yielded mixed outcomes concerning the effect of consumer traits, presuming that the willingness to buy mirrors actual purchasing actions. This inquiry explores the factors that impact young Chinese consumers' intents to purchase organic food, based on the TPB and NAT. This study develops a framework addressing green food consumption among college students and proposes eight hypotheses. Empirical testing confirms the model's positive influence. The findings align with the results of contemporary studies conducted by other researchers (Chen and Xiao, 2012; Pham et al., 2019).

The test results of this article show that college students' purchase intention of green food can be predicted by subjective norms, behavioral attitudes and individual norms. The study revealed that subjective norms, behavioral attitudes, and individual norms strongly influence college students' inclination to consume environmentally friendly food (Al-Swidi et al., 2014; Hasan and Suciarto, 2020). The research results further show that from the perspectives of TPB and NAT, studying college students' consumption intention is the right path, and the measurement method used also meets the needs of this study, providing strong support for further research. Research findings indicate that behavioral attitudes positively influence the propensity of college student consumers to buy green food (Ma and Chang, 2022). Consumer attitude is a key predictor of their intention to buy green food, with research showing a positive association between the proactive buying behaviors of college students and their intention to act autonomously. The positive purchasing actions of these student consumers are strongly correlated with their intent to purchase, where a positive attitude is a primary indicator of the likelihood to buy green food. In terms of management practice, consumer attitudes significantly influence both their purchase intentions and decision-making processes. A more favorable attitude increases the likelihood of a purchase. To motivate ongoing purchases and willingness among college student consumers to pay higher prices, businesses can adopt multifaceted strategies. These include offering superior products and services, intensifying educational and promotional efforts, establishing a strong brand image and reputation, and providing incentives such as discounts and rewards.

This paper innovatively combines the idea of TPB and NAT to propose a novel analytical framework for determining factors that affect Chinese college students' intention to purchase green food. On the basis of existing research, we deeply explored the specific impact of factors such as subjective norms, behavioral attitudes, individual norms, perception of consequences, and attribution of responsibility on consumers' willingness to purchase green food, and confirmed the validity of this theoretical model through empirical research. However, due to time and resource constraints, this study only conducted an online survey in some cities in China, which may limit the representative of the sample and may not fully take into account differences between cities. And as a data collection tool, online questionnaires may have problems such as response bias. Future research could consider combining other survey methods, such as in-depth interviews, to obtain more comprehensive data. There is no clear distinction between the specific types of green food. Future research can be conducted based on different types of green food to provide more targeted policy recommendations. This study is focused solely on China. Subsequent research could explore other countries and regions to validate the generalization of the findings.

Although the combined model of the TPB and the NAT provides an integrated perspective for understanding individual behavior, it is not comprehensive enough to fully encapsulate the vast diversity of human behavior. In studies exploring the willingness of college students to consume green foods, the integrated model of TPB and NAT offers a multidimensional framework for comprehension. However, its limitations are also evident. The model may not adequately capture the full range of behavioral motivations that stem from individual differences,

cultural diversity, and the intricate psychological processes that are specific to certain contexts. Moreover, college students are situated in a dynamic environment and can be influenced by a wide array of factors such as campus culture, social engagements, and familial influences, which may not be sufficiently accounted for in the model.

6 Conclusion and suggestion

The research creates a unified framework using the TPB and NAT to pinpoint factors that influence customers' inclination to purchase environmentally friendly food. Subjective norms, behavioral attitudes, and personal norms all had a significant beneficial impact on college students' intention to purchase green food in this model, with behavioral attitudes having the strongest influence. Moreover, the way repercussions are perceived indirectly affects buying intentions through personal standards and behavioral attitudes. Responsibility attribution affects the desire to buy environmentally friendly food through personal norms. The perception of consequences influences personal norms through responsibility attribution, which then effects purchase intention.

The propensity of consumers to purchase green foods is significantly influenced by their behavioral attitudes, according to research findings. Therefore, in order to promote green food consumption, governments and companies need to adopt effective strategies to change consumer attitudes. At the government level, we recommend stimulating consumers' environmental awareness and responsibility through guiding policies and publicity and education, and encourage them to choose green foods. This includes increasing consumer awareness of the potential negative repercussions of non-sustainable consumption and utilizing official media and slogans to promote more sustainable green food consumption concepts and methods, as well as organizing themed activities and lectures on sustainable consumption. In addition to bolstering consumer awareness and acceptance of green food, these measures may encourage greater environmental responsibility and consciousness regarding green food consumption. Furthermore, to ensure that businesses manufacture genuinely eco-friendly products, the government should increase its oversight of the implementation of environmental protection regulations by corporations. Moreover, the government could further promote green food production and sales by offering tax breaks and additional incentives. For businesses, it is advisable to keenly grasp the influence of consumer behavioral attitudes on purchase intentions, investing more in the integration of green, environmentally friendly concepts and product innovation to enhance environmental performance and product quality. It is essential for enterprises to enhance their interaction and contact with college students, educating them about the environmental advantages and worth of their products, potentially increasing consumers' awareness and confidence in eco-friendly food. Subjective norms have a favorable impact on the desire to buy green food. Therefore, it is suggested that governments create and promote efficient green consumption laws to enhance community identification and responsibility toward green food consumption. This strategy strives to promote a broad culture of eco-friendly consumerism, increasing society's dedication to ecologically responsible actions.

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.

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 from the [patients/participants OR patients/participants legal guardian/next of kin] was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

JH: Writing - original draft, Writing - review & editing. DS: Writing - original draft, Writing - review & editing.

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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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