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EDITED BY
Maria Isabel Miguel,
University of Coimbra, Portugal

REVIEWED BY
Jana Majerova,
AMBIS University, Czechia
Fatima Ezzahra Housni,
Instituto de Investigaciones en Comportamiento Alimentario y Nutrición, Mexico

*CORRESPONDENCE
Linhai Wu
✉ wlh6799@jiangnan.edu.cn

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# Drivers of consumers' intention to adopt sustainable healthy dietary patterns: evidence from China

Xiujuan Chen[1,2], Xue Jiang[1] and Linhai Wu[1,2]*

[1]School of Business, Jiangnan University, Wuxi, China, [2]Institute for Food Safety Risk Management, Wuxi, China

**Introduction:** In line with the shift towards sustainable consumption, sustainable healthy dietary patterns (SHDP) have received considerable attention, but no study has examined Chinese consumers' intention to adopt SHDP.

**Methods:** Based on the theory of planned behaviour (TPB), this study integrated health consciousness, environmental concerns, and past eating behaviour to construct an expanded TPB framework for analyzing the factors influencing Chinese consumers' intention to adopt SHDP. The mediating role of attitude between perceived value and consumers' intention to adopt SHDP was also analyzed. The study empirically tested the research model using structural equation modelling estimation, based on the data collected from 402 local consumers in Wuxi, China.

**Results and discussion:** The results showed that attitude, perceived behavioural control, health consciousness, and past eating behaviuor positively and significantly influenced consumers' intention to adopt SHDP, whereas perceived value indirectly influenced adoption intention through attitude. Subjective norms and environmental concerns had no significant influence on adoption intention. Based on these findings, interventions through dietary education and information campaigns are recommended to enhance consumers' value awareness and attitudes towards SHDP. Interventions, such as nudging, should be designed to enhance consumers' perceived behavioural control and dietary practises. The findings of this study provide important insights for the development of dietary change intervention strategies.

KEYWORDS

**food consumption, sustainable healthy diets, dietary change, eating behaviour, theory of planned behaviour, structural equation modelling**

## 1 Introduction

The increase in prevalence of diet-related non-communicable diseases (NCDs) has become an international public health challenge, amid issues such as climate warming, resource degradation, and the world's growing population that have put the global food system at risk of pushing environmental boundaries (Harrison et al., 2022). Current unsustainable dietary patterns must be transformed on a global scale to make them healthier and more sustainable (Chen et al., 2022). To scientifically promote global dietary change, the Food and Agriculture Organisation of the United Nations (FAO) and World Health Organisation (WHO) jointly released in 2019 the Guiding Principles for Sustainable Healthy Diets (FAO and WHO, 2019). Practising sustainable healthy diets, which are 'dietary patterns that promote all dimensions of individuals' health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable', can help towards the achievement of United Nations Sustainable Development Goals (e.g., SDG3: Good

Health and Well-Being, SDG12: Responsible Consumption and Production, and SDG13: Climate Action; United Nations, 2015). Sustainable healthy diets, as a good start for developing sustainable lifestyles (De Koning et al., 2015), have increasingly attracted widespread attention globally, with a growing body of evidence highlighting actual and potential value in improving public health, mitigating climate change, and contributing to food security (Jarmul et al., 2020).

Dietary change is an important component of a sustainable future (Sobhani et al., 2019). For governments worldwide, promoting the adoption of sustainable healthy dietary patterns (SHDP) by citizens is an important task that requires urgent action, although promoting dietary change is quite difficult (Gonera et al., 2021). A successful shift in the dietary patterns of the Chinese population, currently at 1.4 billion, towards sustainable healthy diets will be crucial for the implementation of the UN 2030 Agenda for Sustainable Development. The Chinese government attaches great importance and actively responds to the UN SDGs initiative, and has established a policy action programme to 'establish a good dietary culture' and 'promote green, healthy and safe consumption' (The 14th Five-Year Plan and 2035 Vision Plan, 2021). Although the Chinese government has a clear vision of promoting a shift in citizens' dietary patterns and consumption towards health and sustainability, social problems arising from irrational dietary consumption continue to impede meaningful change. For example, diet-related chronic diseases amongst Chinese citizens are increasingly reported in younger citizens, with the overweight and obesity rate exceeding 50% (NHSC, 2020). Moreover, the environmental load of natural resources associated with dietary consumption is rising, and changes in the dietary structure of citizens pose an increasing challenge to China's environmental sustainability (Yin et al., 2021). Developing and implementing scientific and effective interventions to promote citizens' adoption of SHDP are thus challenges for the Chinese government.

Policymakers know that changes in consumer behaviour are critical to any policy process aimed at integrating nutritional health and environmental sustainability (Lang and Barling, 2013). Consumers are often seen as the key to driving changes within the food system (Camilleri et al., 2019) because changes in demand can be transmitted back along the supply chain (Righi et al., 2023). Driving changes in consumer dietary patterns is viewed as a reasonable solution for achieving upstream food sustainability goals (Blackstone et al., 2018; Schwingshackl et al., 2020). Steenson and Buttriss (2021), for example, proposed that by changing food consumption patterns, healthy and sustainable eating behaviour can be established at the consumer end of the chain, to achieve healthy and sustainable source-to-table development. The health and environmental benefits of large-scale dietary changes have also been investigated. Springmann et al. (2018) confirmed in a global study that a reduction in animal-derived foods reduces premature mortality. Specifically, if plant-based foods could replace 25 to 100% of animal-derived foods, global premature mortality would be 4 to 12% lower by 2030 compared with 2010. Sheng et al. (2021) suggested that if all Chinese consumers consistently adopted the recommended healthy dietary patterns, diet-related chronic diseases and mortality rates would be significantly lower, and this dietary change would also reduce greenhouse gas (GHG) emissions by 146 to 202 million tons (18 to 25%) compared with the projected emission levels in 2030. Achieving future shifts in the diets of populations towards healthier and more sustainable patterns will require the promotion of large-scale changes in consumer dietary pattern choices (Jarmul et al., 2020). However, any attempt to change dietary patterns must take full account of consumer intention and local contextual realities to achieve population-wide, lasting change.

In line with the trend towards sustainable consumption, the factors influencing choices of sustainable healthy diets have garnered significant attention from the academic community in recent years, leading to a continuous emergence of academic research. For example, Benedetti et al. (2018), approaching from a lifestyle perspective, highlighted the significant impact of education, regular physical exercise, and family dietary habits on improving dietary adherence, emphasising the importance of consumers' self-regulation abilities and lifestyle choices in developing healthy dietary habits. Fink et al. (2021), starting from a socio-economic perspective, pointed out that an individual's socioeconomic status, including their economic status and income level, plays an important role in driving consumers to adopt a sustainable diet. Baur et al. (2022) linked nutritional health and environmental impact with individual dietary intentions and found that healthy eating intentions were significantly higher than environmentally sustainable eating intentions in terms of behavioural transformation, highlighting the leading role of personal health goals in dietary decision-making. Barbour et al. (2023) analyzed the facilitating and inhibiting factors of healthy sustainable diets from a policy perspective, emphasising the role of local governments in promoting policies related to sustainable healthy diets. These studies showcase, from multiple perspectives, the diverse factors influencing the choices of dietary patterns, which offer valuable insights for understanding and directing consumer behaviour towards sustainable healthy dietary consumption.

However, existing relevant studies have the following research gaps. First, although existing studies emphasise the importance of changing dietary patterns on a global scale, little attention has been paid to the perceived value, attitudes, and adoption intention of Chinese consumers towards SHDP, and the applicability of previous findings based on samples of European and American consumers to the Chinese sociocultural context has not been tested. Second, many studies apply the theory of planned behaviour (TPB) to food consumption, but few studies have applied health consciousness, environmental concerns, and past eating behaviour as TPB-expanding factors to consumers' intention to adopt SHDP. Even fewer studies have examined whether perceived value contributes to consumers' intention to adopt SHDP. To address the above research gaps, we used an extended TPB, collected data through field questionnaires, and empirically analyzed the main influencing factors and internal mechanisms of consumers' intention to adopt the SHDP in the Chinese sociocultural context. We aimed to theoretically bridge the deficiencies in existing research on healthy sustainable dietary behaviour and provide a new empirical basis for the design of interventions that can promote dietary change in consumers.

## 2 Literature review and hypotheses development

### 2.1 Theory of planned behaviour

Proposed by Ajzen (1991), TPB is widely used to predict and explain the general behaviour of individuals and their behavioural

decision-making processes. This widely used psychological theory suggests that behavioural intention is the most reliable predictor of an individual's actual behaviour and is determined by three psychological factors: attitude, subjective norms, and perceived behavioural control (Ajzen, 1991). When an individual has more positive attitudes towards performing a certain behaviour, perceive more social pressure to perform the behaviour, and feel empowered to perform the behaviour, then the individual will have a higher intention to perform the behaviour, and consequently, the actual behaviour will more likely occur. The TPB is generally useful for predicting behavioural intention and has been widely recognised as a conceptual model for capturing behaviour. However, the TPB is not perfect, and the main criticism is that it focuses on rational reasoning and does not thoroughly explain behaviour (Visschers et al., 2016). Nejad et al. (2004) pointed out that other specific factors should be introduced to supplement and improve research on individual behavioural decision-making in specific situations to further improve the effectiveness and applicability of the TPB. Many studies have attempted to improve the explanatory power of TPB models by adding other components as predictors of behaviour (Tang et al., 2023).

The TPB has generally been used to predict consumers' behavioural intentions and has been widely used in related studies on health, pro-environment, and sustainable consumption behaviours (McEachan et al., 2011; Shukri et al., 2016; Tang et al., 2023). Some scholars have used the TPB as a theoretical basis to predict and explain individual intentions regarding healthy or sustainable diets (Visschers et al., 2016; Biasini et al., 2021; Jha et al., 2023). Many of these previous studies have focused on healthy eating intentions, and the few have focused on sustainable eating intentions to reduce food waste. Despite differences in perspectives between the literature and our study, the former provided inspiration and reference for our work. For example, Ploll and Stern (2020) applied TPB analysis to reveal the significant relation between subjective norms, attitudes, behavioural intentions, and vegetarian and vegan behaviours. Sogari et al. (2023) provided new insights into how TPB constructs (attitudes and subjective norms) significantly predict the intention to adopt a healthy diet. Kramer et al. (2023) supported the validity of the TPB in explaining healthy eating and cooking behaviour, suggesting that interventions targeting TPB constructs (attitude, subjective norms, perceived behavioural control, and intention) may help create behaviour change in specific populations. These studies suggested that attitude, subjective norms, and perceived behavioural control are important predictors of consumers' dietary adoption intention and that the likelihood of triggering an individual's dietary behaviour practise depends on their dietary intention (Kramer et al., 2023). However, the influence of various aspects (attitude, subjective norms, and perceived behavioural control) on consumers' intention to adopt dietary patterns may vary with cultural their background. As Hwang et al. (2003) pointed out, different cultural contexts may produce completely different consumer behaviours.

## 2.2 Hypothesis development

### 2.2.1 Attitude

Attitude can be defined as a positive or negative evaluation of behaviour and outcomes. Ajzen (1985) indicated that the relation between attitudes and behavioural intention may be the most predictable and more significant in the TPB framework. Scholars generally agree on the significant positive correlation between individual attitudes and adoption intention (Al-Swidi et al., 2014). In the area of food and beverage consumption, Dunn et al. (2011) also showed that consumers intention to consume fast food is significantly influenced by their attitudes. As such, we proposed the following hypothesis:

> *H1*: Attitude positively influences consumers' intention to adopt SHDP.

### 2.2.2 Subjective norms

Subjective norms refer to the extent to which individuals respect the opinions and evaluations of others who are important to them, and then use the same as standards or principles for personal behaviour. Subjective norms are positive predictors of consumer food purchase intentions (Sultan et al., 2020). They also predict sustainable food consumption (Shen et al., 2022). Stranieri et al. (2017) further argued that they have some validity in explaining consumers' dietary decisions and advocated for a more nuanced study of subjective norms. Hence, we proposed the following hypothesis.

> *H2*: Subjective norms positively influence consumers' intention to adopt SHDP.

### 2.2.3 Perceived behavioural control

Perceived behavioural control is an individual's perceived ease of performing a behaviour (including influences, e.g., time, knowledge, and money) and primarily measures an individual's perception of whether a behaviour can be accomplished by their own volition (Ajzen, 1991). Consumers' perceived behavioural control is an important factor influencing intention to consume organic food; a higher perceived behavioural relates to a stronger purchase intention (Carfora et al., 2019). Given that organic food is often considered a food choice that consumers would make if they adopt SHDP, and consumers' intention to adopt SHDP is similar in essential attributes to their intention to purchase organic food, we proposed the following hypothesis.

> *H3*: Perceived behavioural control positively influences consumers' intention to adopt SHDP.

### 2.2.4 Past eating behaviour

Past eating behaviour refers to whether an individual's daily dietary pattern meets the criteria for being healthy and sustainable. Increasing the intensity of past behaviours or habits significantly improves the interpretation of behaviour by the TPB (McEachan et al., 2011). The frequency of an individual's past behaviours reflects the strength of past behaviours and directly influences future behavioural choices (Honkanen et al., 2005). Good behaviours recur, and when consumers have more experience adopting a certain behavioural pattern in the past, then consumers are more accepting of that pattern, and the pattern is also highly attractive to consumers (Dean et al., 2012; Li et al., 2018). Past behaviour has been explored as an expansion factor of TPB and a powerful tool for predicting an individual's future behavioural intention (Vallejos et al., 2023). Koklic et al. (2019) noted that consumers' past organic food consumption has a positive effect on their organic food purchase intention and that the overall effect of

past behaviour on intention is stronger than that of other factors. In other words, the more an individual's past eating behaviour meets the criteria for SHDP, the stronger is their intention to adopt that dietary pattern. Therefore, we proposed the following hypothesis:

> *H4*: Past eating behaviour positively influences consumers' intention to adopt SHDP.

### 2.2.5 Health consciousness

Health consciousness is an important psychological construct defined as 'the degree to which health issues are integrated into one's daily activities', which reveals a person's willingness to engage in healthy behaviours (Jayanti and Burns, 1998; Espinosa, 2021). Health consciousness is an important motivator for consumers' decisions to purchase healthy foods (e.g., organic foods). Consumers with lower health consciousness have relatively weaker intention to purchase organic foods (Suttikun, 2023). In China, after the easing of the COVID-19 pandemic, consumers are paying more attention to health issues. Eating healthy food is becoming more popular, and people are more inclined to consider health factors when making dietary decisions. Considering that health consciousness may be an important factor influencing consumers' intention to adopt SHDP, we proposed the following hypothesis.

> *H5*: Health consciousness positively influences consumers' intention to adopt SHDP.

### 2.2.6 Environmental concern

Environmental concern indicates 'the degree to which people are aware of problems regarding the environment and support efforts to solve them or indicate the willingness to contribute personally to their solution' (Dunlap and Jones, 2002). Personal concern for the environment has a direct and positive impact on consumers' intention to purchase environmentally friendly products (Pagiaslis and Krontalis, 2014) and is directly related to environmentally friendly behaviours (Cheung and To, 2019). In the context of food consumption, environmental concern is believed to play an important role in determining purchase intention for organic food products (Smith and Paladino, 2010). Consumers who prefer organic products are more likely to engage in environmental activities (Kumar et al., 2021). As such, environmental concern may be an important predictor of consumers' willingness to adopt SHDP, leading to the following hypothesis.

> *H6*: Environmental concern positively influences consumers' intention to adopt SHDP.

### 2.2.7 Perceived value

According to Zeithaml (1988), perceived value is defined as a consumer's assessment based on the benefits of a product, particularly concerning the perceived or received value compared with the sacrifices one must make. Perceived value influences consumer attitudes and behavioural intention (Petrick and Backman, 2002). The more positive one's perceived value is, the more positive their intention, which further leads to a stronger motivation that drives actual actions (Fiandari et al., 2019). The importance of perceived value in consumers' green consumption behaviour is well understood. Consumers' perceived value increases their willingness to purchase green products (de Medeiros et al., 2016). Specific to the food consumption context, Jamal and Sharifuddin (2014) showed that perceived positive value enhances consumers' purchase intention for halal food. Li et al. (2020) reported a positive relation between consumers' perceived value and behavioural intention towards environmentally friendly agri-food products. Consumers' perceived value of SHDP may influence their attitudes and intention to adopt. Hence, we proposed the following hypotheses.

> *H7a*: Consumers' perceived value is a positive determinant related to attitude.
>
> *H7b*: Consumers' perceived value positively influences their intention to adopt SHDP.
>
> *H7c*: Attitude mediates the relation between consumer perceived value and intention to adopt SHDP.

## 3 Methods

### 3.1 Questionnaire design and data collection

Based on the existing measurement items (Supplementary Table S1 lists the reference sources), we designed structured questionnaires to collect data and analyse the proposed hypotheses (see as Figure 1). The full questionnaire is provided in the Supplementary materials. The three-part questionnaire investigated the participants' demographic characteristics; past eating behaviour (PEB), health consciousness (HC), and environmental concern (EC); and perceived value (PV), attitude (AT), perceived behavioural control (PBC), subjective norms (SN), and intention to adopt (IA) SHDP. The questionnaire also included a clear definition of Sustainable Healthy Diets, which was carefully explained to respondents by trained investigators during the survey. The items in the questionnaire, which addressed the eight core variables in the analytical framework of our study, were measured on a five-point Likert scale, with respondents answering how much they agreed with specific statements, ranging from 'strongly disagree' = 1 point to 'strongly agree' = 5 points. All measurement items were derived from well-established scales in existing studies and adapted appropriately to the context of SHDP adoption by Chinese consumers. The initial questionnaire was first test-filled by experts and investigators. Based on the feedback, we modified the semantic ambiguities and inaccuracies of expression in the questionnaire. Next, we conducted a pre-survey amongst 50 consumers in Wuxi. Questionnaire topics were adjusted, added, or subtracted after two rounds of testing, to form a final questionnaire for data collection.

The offline field survey was conducted in April 2023 across the administrative districts of Wuxi City, China. Wuxi is known as the 'land of fish and rice' in China, with abundant produce and a favourable ecological environment. The economy of Wuxi is well developed, with its GDP *per capita* ranking first in the country for three consecutive years from 2019 to 2022. Residents of the city have strong purchasing power and a relatively high level of scientific literacy in food safety and dietary health. The Jiangnan diet, an healthy dietary pattern similar to the Mediterranean diet, is popular in Wuxi. We used non-probability sampling, which is suitable for studies that aim to test hypotheses on the relation between specific variables and behaviour (Leary, 2004).

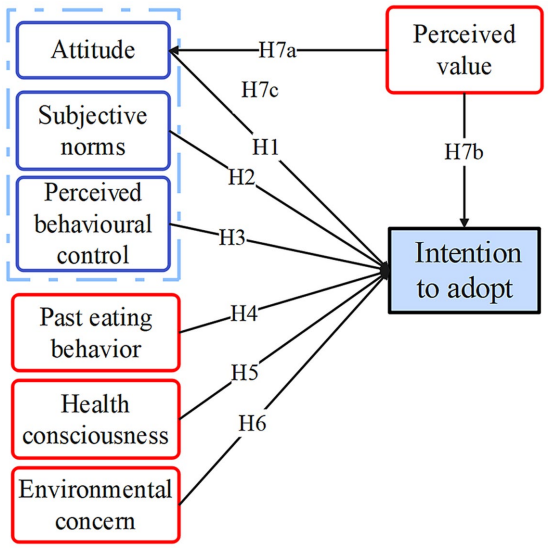


FIGURE 1
Conceptual framework.

This method also offers benefits in terms of cost, convenience, and time (de Medeiros et al., 2016; Fiandari et al., 2019). The survey was conducted mainly in large supermarkets, farmers' markets, and neighborhoods with high customer flow, targeting Wuxi residents aged 18 years and older. Trained investigators provided clear explanations and definitions of relevant terms and concepts in the process of the one-to-one questionnaire survey. A total of 422 questionnaires were distributed and 402 valid questionnaires were collected, with a valid sample ratio of 95.3%. The studies involving human participants were reviewed and approved by Jiangnan University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## 3.2 Data analysis

Structural equation modelling (SEM) allows for the simultaneous analysis of many relations and is one of the most commonly used methods for interpreting behaviour and survey data (Secer et al., 2023). It can assess measurement errors, calculate latent structures, and estimate and evaluate complex (Stein et al., 2012) or multifaceted models (MacKenzie, 2001) from observed variables. We applied the SEM method of maximum likelihood estimation to test the research path hypothesis and mediation effect. SPSS (version 25.0) and AMOS (version 26.0) were used for SEM analysis. The SEM algorithm involved two stages: validating the measurement model and testing the structural model.

# 4 Results

## 4.1 Demographic characteristics

Table 1 summarises the respondent profiles. Compared with the statistics published by the Wuxi Municipal People's Government, our sample was similar to the Wuxi population in terms of sex, age, and income; however, the proportion of respondents with higher education was higher than that of Wuxi as a whole. Overall, the survey sample was acceptably representative. The mean values of each variable are shown in Supplementary Table S1, in which the mean value of consumers' IA (3.69) implied a relatively strong intention to embrace SHDP.

## 4.2 Reliability and validity test

First, we tested the scale using the Kaiser–Meyer–Olkin (KMO) sample fit test and Bartlett's sphericity test. The KMO value (0.930, more than 0.7) and Bartlett's sphericity test result ($\chi^2 = 6191.881$, $p < 0.001$) indicated that the data were suitable for factor analysis. We then conducted a confirmatory factor analysis to analyse the reliability, convergent validity, and discriminant validity of the scales. As shown in Table 2, the Cronbach's alpha coefficients for each latent variable were above the critical value of 0.7 (Taber, 2018), and the factor loadings were more than 0.6 (Chin et al., 1997), indicating an acceptable level of reliability. The average variance extracted (AVE) value for each latent variable was greater than the critical value of 0.5 (Bagozzi and Yi, 1988), and the composite reliability (CR) values were all greater than the critical value of 0.7 (Fornell and Wernerfelt, 1987), indicating high convergent validity amongst the variables. In addition, the square root of the AVE for each latent variable (Table 3) was greater than the correlation coefficients of the rows and columns located below the diagonal, suggesting acceptable discriminant validity between the variables (Hair et al., 2019).

Next, to avoid the impact of the non-normal distribution of data on SEM hypothesis testing (Li and Shao, 2023), we used SPSS 25.0 to test the distribution of the sample data. The results (Supplementary Table S1) showed that the absolute value of the skewness coefficient of the sample data ranged from 0.008 to 0.900, none of which was over 3, and the absolute value of the kurtosis coefficient ranged from 0.019 to 0.772, none of which was over 8, indicating that the sample data conformed to a normal distribution and could be used in the SEM for hypothesis testing (Teisl et al., 2009).

Given that the data were obtained from respondents' self-reported questionnaires, we needed to test for common method bias (CMB). Therefore, we conducted an exploratory factor analysis of all variables through Harman's single-factor test (Harman, 1976): CMB is confirmed if the first factor accounts for >50% of the variance amongst the variables (Gao et al., 2022). Our test showed that the eigenvalue variance percentage of the factor was 35.087%, much lower than the threshold of 50%, suggesting that CMB was not an issue.

To test for multicollinearity amongst the latent variables, we conducted a variance inflation factor (VIF) test. The results showed that the VIF of each variable in the model ranged from 1.622 to 3.465 (see as Supplementary Table S2), much lower than the threshold of 10 for multicollinearity amongst latent variables (Timm, 2002). Therefore, the latent variables in our model had no obvious multicollinearity problem.

## 4.3 Structural model testing

We constructed a structural equation model based on the theoretical model. Before testing the hypothesised relations,

TABLE 1 Demographic characteristics of respondents ($N = 402$).

| Demographic | Category | Frequency | Proportion (%) |
|---|---|---|---|
| Sex | Male | 206 | 51.2 |
| | Female | 196 | 48.8 |
| Age (years) | 18–22 | 97 | 24.1 |
| | 23–32 | 159 | 39.6 |
| | 33–42 | 94 | 23.4 |
| | 43–52 | 41 | 10.2 |
| | 53–65 | 11 | 2.7 |
| Education | Junior high school or lower | 25 | 6.2 |
| | High school (including vocational high school) | 220 | 54.7 |
| | Junior college (including higher vocational college) | 47 | 11.7 |
| | Bachelor's degree | 87 | 21.7 |
| | Master's degree | 23 | 5.7 |
| Marital status | Married | 177 | 44.0 |
| | Unmarried | 225 | 56.0 |
| Personal annual income | <5,000 RMB | 108 | 26.9 |
| | 5,001–8,000 RMB | 132 | 32.8 |
| | 8,001–12,000 RMB | 100 | 24.9 |
| | 12,001–20,000 RMB | 39 | 9.7 |
| | >20,000 RMB | 23 | 5.7 |
| Occupation | Civil servant | 17 | 4.2 |
| | Public sector employee | 39 | 9.7 |
| | Company employee | 123 | 30.6 |
| | Farmer | 12 | 3.0 |
| | Freelancer | 61 | 15.2 |
| | Retirees | 8 | 2.0 |
| | Student | 100 | 24.9 |
| | Unemployed | 8 | 2.0 |
| | Others | 34 | 8.4 |

TABLE 2 Construct validity and reliability.

| Construct | FL | Cronbach's α | CR | AVE |
|---|---|---|---|---|
| Attitude | | 0.788 | 0.793 | 0.562 |
| AT1 | 0.685 | | | |
| AT2 | 0.783 | | | |
| AT3 | 0.776 | | | |
| Subjective norms | | 0.801 | 0.807 | 0.513 |
| SN1 | 0.689 | | | |
| SN2 | 0.785 | | | |
| SN3 | 0.737 | | | |
| SN4 | 0.647 | | | |
| Perceived behavioural control | | 0.754 | 0.753 | 0.505 |
| PBC1 | 0.736 | | | |
| PBC2 | 0.652 | | | |
| PBC3 | 0.741 | | | |
| Intention to adopt | | 0.853 | 0.854 | 0.662 |
| IA1 | 0.799 | | | |
| IA2 | 0.824 | | | |
| IA3 | 0.817 | | | |
| Health consciousness | | 0.782 | 0.784 | 0.548 |
| HC1 | 0.768 | | | |
| HC2 | 0.683 | | | |
| HC3 | 0.767 | | | |
| Environmental concern | | 0.893 | 0.893 | 0.737 |
| EC1 | 0.880 | | | |
| EC2 | 0.872 | | | |
| EC3 | 0.822 | | | |
| Past eating behaviour | | 0.902 | 0.903 | 0.574 |
| PEB1 | 0.858 | | | |
| PEB2 | 0.816 | | | |
| PEB3 | 0.767 | | | |
| PEB4 | 0.717 | | | |
| PEB5 | 0.653 | | | |
| PEB6 | 0.682 | | | |
| PEB7 | 0.786 | | | |
| Perceived value | | 0.772 | 0.774 | 0.534 |
| PV1 | 0.774 | | | |
| PV2 | 0.765 | | | |
| PV3 | 0.647 | | | |

FL, factor loading; CR, composite reliability; AVE, average value extracted.

we compared the extended TPB model with the original TPB model. Table 4 presents the various fit indices of the model. According to previous scholars, the chi-squared degrees of freedom ratio ($\chi^2/df$) of the model should be between 1 and 3; the root mean square error of approximation (RMSEA) and standardised root mean square residual (SRMR) should be less than 0.08 (Hu and Bentler, 1998); and the normed fit index (NFI) should be greater than 0.8 (Chakraborty et al., 2008). According to the index values of $\chi^2/df$, RMSEA, and SRMR (Table 4), the extended TPB model had a better fit than the original TPB model. Moreover, the explanatory power of the extended theoretical model for consumer IA SHDP ($R^2_{IA} = 0.756$) was better than that of the original TPB model ($R^2_{IA} = 0.640$). Thus, our extended theoretical model had a better explanatory power than the original TPB model.

As shown in Figure 2, the assessment results of the structural model demonstrated that AT significantly and positively affected IA

TABLE 3 Discriminant validity.

| Construct | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. AT | **0.749** | | | | | | | |
| 2. SN | 0.367 | **0.716** | | | | | | |
| 3. PBC | 0.625 | 0.608 | **0.711** | | | | | |
| 4. HC | 0.689 | 0.458 | 0.521 | **0.740** | | | | |
| 5. EC | 0.425 | 0.475 | 0.539 | 0.487 | **0.858** | | | |
| 6. PEB | 0.499 | 0.511 | 0.607 | 0.504 | 0.401 | **0.757** | | |
| 7. PV | 0.509 | 0.420 | 0.441 | 0.458 | 0.377 | 0.651 | **0.731** | |
| 8. IA | 0.749 | 0.552 | 0.694 | 0.721 | 0.511 | 0.707 | 0.590 | **0.813** |

Square root of AVE in diagonal (bold). AT, Attitude; SN, Subjective norms; PBC, Perceived behavioural control; HC, Health consciousness; EC, Environmental concern; PEB, Past eating behaviour; PV, Perceived value; IA, Intention to adopt.

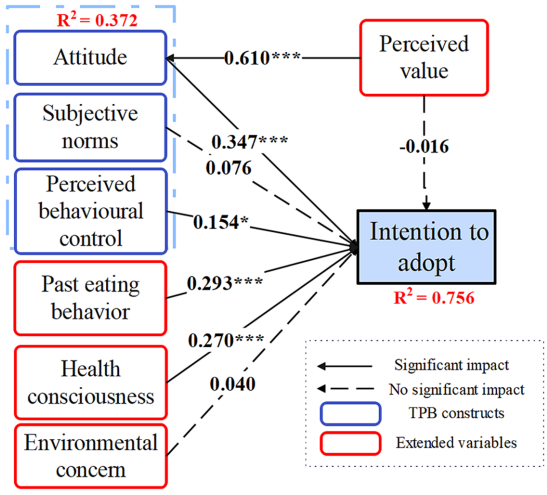


FIGURE 2
Estimated results for the extended TPB structural model.

TABLE 4 Summary of model fit.

| Items | Standard value | Extended model | TPB model |
|---|---|---|---|
| $\chi^2/df$ | 1–3 | 1.848 | 2.172 |
| RMSEA | <0.08 | 0.046 | 0.054 |
| SRMR | <0.08 | 0.061 | 0.098 |
| CFI | >0.9 | 0.950 | 0.968 |
| NFI | >0.8 | 0.897 | 0.942 |
| Chi-squared | | 654.111 | 130.306 |
| $R^2$ | | 0.756 | 0.640 |

$\chi^2$/df, the chi-squared degree of freedom ratio; RMSEA, root mean square of approximation error; SRMR, standardised root mean square residual; CFI, comparative fit index; NFI, normed fit index; chi-squared, chi-square value; and $R^2$, model fit.

($\beta = 0.347$, $p < 0.001$), confirming H1. SN did not significantly influence IA ($\beta = 0.076$, $p = 0.186$); thus, H2 was rejected. PBC positively influenced IA ($\beta = 0.154$, $p < 0.05$), supporting H3. PEB positively influenced IA ($\beta = 0.293$, $p < 0.001$); thus, hypothesis H4 was supported. HC positively influenced IA ($\beta = 0.270$, $p < 0.001$), supporting H5. EC did not significantly influence IA ($\beta = 0.040$, $p = 0.417$); thus, hypothesis H6 was rejected. PV significantly and positively affected AT ($\beta = 0.610$, $p < 0.001$); thus, hypothesis H7a was supported. Interestingly, PV did not have a direct effect on IA; thus, H7b was rejected. As shown in Figure 2, IA explained 75.6% of the total variance of all its antecedent variables, indicating that our hypothesised model had high explanatory validity for consumers' intention to adopt SHDP.

## 4.4 Mediating effect analysis

Using AMOS 26.0 software, we analysed the mediating effects included in the model. We used the bias-corrected nonparametric percentile bootstrap method, with the number of samples set to 2,000. We thus determined the direct, indirect, and total effects of the PV, AT, and IA. The results of the bootstrap test, shown in Table 5, demonstrated that consumer PV had no direct effect on IA; however, the indirect and total effects were significant. The confidence intervals for the indirect effect of the path PV → AT→AI did not contain zero, indicating that PV had an indirect, fully mediated effect on IA through AT. Therefore, H7c was supported.

# 5 Discussion

## 5.1 Interpretation of results

This study extended the TPB model to explore the drivers that promote the intention to adopt SHDP of Chinese consumers. The results showed that attitudes played an important role in driving consumers' intention to adopt SHDP—it increased significantly when the consumers had a positive attitude towards SHDP. This finding coincided with previous conclusions on the positive correlation between attitude and behavioural intention with respect to food purchasing and healthy eating intention (Al-Swidi et al., 2014; Sogari et al., 2023). Our study confirmed that consumers' perceived value affected their attitudes and had a significant indirect effect on their intention to adopt SHDP through attitude. Similarly, Albertsen et al. (2020) reported that consumer acceptance of food innovations may be related to perceived value. Indeed, SHDP is a novel dietary pattern for

TABLE 5 The results of the bootstrap mediating effect test.

| Path | Effect | Point estimate | Boot SE | Bootstrapping | | | |
|---|---|---|---|---|---|---|---|
| | | | | Bias-corrected (95% CI) | | Percentile (95% CI) | |
| | | | | Lower | Upper | Lower | Upper |
| PV→AT→AI | Direct effect | −0.016 | 0.095 | −0.197 | 0.169 | −0.212 | 0.156 |
| | Indirect effect | 0.212*** | 0.046 | 0.135 | 0.316 | 0.134 | 0.314 |
| | Total effect | 0.196* | 0.084 | 0.044 | 0.364 | 0.032 | 0.354 |

Chinese consumers, and its adoption implies food innovation. To the best of our knowledge, in the field of research on sustainable healthy diet consumption behaviour, our study provides the first empirical evidence for the indirect incentive role of consumers' perceived value on the adoption of SHDP in the Chinese sociocultural context.

We also confirmed the importance of perceived behavioural control as a factor directly related to consumers' intention to adopt SHDP. This is consistent with the findings of previous studies on Chinese consumers' food purchase intention (Li and Jaharuddin, 2020; Qi and Ploeger, 2021). Perceived behavioural control reflected consumers' subjective feelings regarding the availability, identification, and convenience of sustainable healthy diets. When consumers subjectively perceived sustainable healthy diets as more accessible and easier to identify, then they would have fewer obstacles to adjusting their dietary patterns towards healthy and sustainable changes. As such, their intention to adopt SHDP would naturally increase.

Subjective norms did not have any effect on consumers' intention to adopt SHDP, coinciding with previous findings on the limited ability of subjective norms to predict behaviour in the TPB (Yazdanpanah and Forouzani, 2015). In a meta-analysis of the psychosocial determinants of pro-environmental behaviours, Bamberg and Möser (2007) found no direct link between subjective norms and intention. A possible explanation is that subjective norms are unstable and vary in different contexts. Moreover, different respondents may be influenced by different target groups, and the effectiveness of subjective norms is reduced when respondents do not identify with a defined target group (family, friends; Trafimow and Finlay, 1996).

The expanded TPB we constructed also contained other constructs, such as past eating behaviour, health consciousness, and environmental concern. Consumers' past eating behaviours significantly influenced adoption intention towards SHDP. That is, the more a consumer's actual past eating behaviour met the criteria for SHDP, the more acceptable and willing they would be to adopt it. Rivis and Sheeran (2003) suggested that the impact of past eating behaviours depends on whether the behaviours have become habitual, in which the individual becomes guided by external environmental cues and develops an automatic response that is not driven by cognitive factors. Thus, past eating behaviour may positively influence the intention to adopt a dietary pattern, even if the consumer lacks precise knowledge of sustainable healthy diets.

Health consciousness can predict a person's intention to engage in healthy behaviours (Rahamat et al., 2022). We found that consumers' health consciousness directly and positively influenced their intention to adopt SHDP. Indeed, amid the increased health consciousness worldwide, health consciousness is not only a driver for promoting healthy food choices amongst consumers but also a major driving factor behind consumers' adoption of sustainable dietary behaviours (Kareklas et al., 2014).

Meanwhile, we found that environmental concern did not have a direct effect on consumers' intention to adopt SHDP. Consumers' values and personal priorities are known to be important factors that influence their behavioural intentions (Arora et al., 2022); egoism-driven health consciousness is more important than altruism-driven environmental concern in the case of dietary consumption. Research on organic food has shown that consumers' environmental concerns are drivers of green consumer behaviour in China (Ahmed et al., 2021). However, Chinese consumers' awareness of SHDP is lacking because it is still an emerging concept in China, and most ignore the connection between diet and environmental sustainability. The objects of environmental concern are familiar environmental behaviours, such as reducing the use of plastic bags (Sun et al., 2017) and purchasing recycled products (Zhang and Luo, 2021). This may explain how environmental concern does not drive the intention to adopt SHDP.

## 5.2 Theoretical implications

We expected our study to contribute to the literature in two ways. First, it expands the scope of research on the TPB in the fields of food and diet consumption. As a social psychological model that can effectively identify and elucidate consumer behaviour and behavioural intention, the TPB has seen applications in the field of food/diet consumption behaviour, but they have focused on organic food purchasing, environmentally friendly food consumption, healthy eating behaviour, and food waste reduction behaviour (Al-Swidi et al., 2014; Visschers et al., 2016; Jha et al., 2023). Meanwhile, our study extends the TPB in terms of health consciousness, environmental concern, and past eating behaviour and applies it to explore the main influencing factors and internal mechanisms of Chinese consumers' intention to adopt SHDP. Our work fills the research gap in the TPB in the field of sustainable consumption, especially in the sociocultural context of China.

Second, it provides a new perspective for promoting consumer intention to adopt SHDP. Previous studies on individual-level sustainable healthy dietary behaviours are typically qualitative works on cognitions, attitudes, motivations, and barriers; the few quantitative empirical analyses have focused on developed countries in Europe and on the US (Van Loo et al., 2017; Verain et al., 2017; Claessens et al.,

2023). By collecting sample data from a Chinese city in Wuxi, our empirical analysis provides evidence of the importance of enhancing consumers' perceived value in motivating them to adopt SHDP, thus filling the current research gap related to the relation between consumers' perceived value and their adoption of SHDP, and providing additional evidence for elucidating the psychological mechanisms of consumers' dietary change, especially in the context of healthy and sustainable diet consumption.

## 5.3 Policy implications

Our findings also provide important insights for the development of dietary change interventions and offer valuable implications for policymakers. First, interventions should be designed and implemented to target attitude and awareness, as attitude and health consciousness are the most direct drivers motivating consumers to adopt SHDP. Given the close relation between attitude and perceived value, interventions should encourage consumers to develop favourable perceived values to boost positive attitudes towards SHDP. As mentioned by Verain et al. (2017) and Jalil et al. (2020), raising awareness and shaping attitude through education and information campaigns to encourage voluntary dietary behaviour change amongst consumers are the most commonly used soft policy interventions aimed at facilitating a shift towards sustainable healthy diets. Educating consumers about the impact of their dietary choices on personal health and the environment may increase their awareness, interest, and recognition of the value of sustainable healthy diets (Van Loo et al., 2017), thereby improving attitudes and facilitating dietary shifts. The accumulation of information increases the overall social awareness, gradually motivates consumers to take action (Cummings and Proctor, 2014), and encourages educational campaigns to raise social awareness (Willett et al., 2019). We recommend that governments and public welfare organizations strengthen dietary education and information popularisation. In particular, education campaigns should inform consumers on not only the 'what' (promoting the concept of sustainable healthy diet consumption and providing scientific knowledge about sustainable healthy diets) but also the 'why' (emphasising the egoistic and altruistic values of sustainable healthy diets, focusing on the health benefits and complementing it with scientific information on the environmental impacts of diets) and the 'how' (providing consumers with personalised advice and guidance, such as healthy and environmentally friendly recipes and easy-to-follow cooking tips).

Given that individuals with little knowledge or interest in sustainable healthy diets may be less likely to respond immediately to awareness-raising interventions (Jalil et al., 2020), policymakers should also focus on the impact of perceived behavioural control and past eating behaviour on consumer adoption of SHDP. We recommend 'nudging' interventions that push consumers towards sustainable healthy diets but do not rely on education to raise awareness. In nudging, 'nudges' use mild, more implicit intervention strategies that can easily and even unconsciously influence people's choices and behaviour in a desired direction (Thaler and Sunstein, 2008). Interventions designed on behavioural nudges (product accessibility, default options, priming), such as meat-free days in public canteens and positive positioning of sustainable healthy foods in retail settings, can lead consumers to voluntarily switch to SHDP in a gentle way in the immediate choice context (Junghans et al., 2015; Van Loo et al., 2017; Pelle G Hansen et al., 2021). These types of nudging interventions based on behavioural insights may help repeatedly trigger consumers' healthy sustainable eating behaviour to change their future dietary choices.

The integrated implementation of multiple policies and interventions will create more opportunities for dietary change in the population. Therefore, in addition to soft policy interventions, hard policy interventions, including laws, fiscal measures, subsidies, penalties, and other economic and structural measures (Willett et al., 2019), are critical for building a supportive environment for sustainable healthy diets. For example, incentives or subsidies should be provided to encourage the production and marketing of sustainable healthy foods, promote the sustainable development of the food industry, and support food production practises that reduce GHG emissions. In addition, promoting sustainable healthy diets at the population level requires multiple actors to work together, which in turn requires strengthened governance and partnerships to address the challenge of changing diets in an effective cross-sectoral manner (De Schutter et al., 2020). Interventions to promote mass sustainable healthy diets must benefit people of low socioeconomic status and be developed in conjunction with the social safety nets necessary to effectively address poverty and inequality (De Schutter et al., 2020).

## 5.4 Limitations and future directions

There are inevitably some limitations in interpreting our study, and these limitations provide opportunities for further research. First, we investigated the drivers of consumers' intention to adopt sustainable healthy dietary patterns, as exemplified by residents of Wuxi City in China. However, it must be acknowledged that other factors, including consumer self-regulation and the social environment, were not covered due to constraints in the research scope and methodology. Second, our study did not address consumers' actual food choices. Future studies could combine participation measurements and actual food choice data, such as those obtained through choice experiments or dietary intake assessments, to further investigate the relation between participants and sustainable healthy food choices, and to more objectively estimate the health and sustainability attributes of sustainable healthy diets. Finally, as with most research in the field, our study relied on self-reported measures that, whilst providing valuable insights, may introduce some biases and limitations, such as the possibility that respondents may be influenced by social expectations and thus deviate from actual behaviour (Fisher, 1993). Additional experimental and observational studies are required to overcome these limitations.

# 6 Conclusion

Dietary consumption is an indispensable component of daily consumption, and promoting dietary change towards healthy and sustainable patterns is essential for sustainable consumption. We proposed an extended TPB analytical framework to explore the key drivers of Chinese consumers' intention to adopt SHDP. Our findings suggested that attitudes, health consciousness, past eating behaviour, and

perceived behavioural control positively influenced consumers' intention to adopt SHDP, whereas perceived value had a significant positive effect on adoption intention through attitudes. However, we did not find a significant effect of subjective norms or environmental concern on adoption intention. Our results supported the notion that consumers' intention to adopt SHDP was generally high and confirmed the potential advantages to promoting sustainable healthy diets in China. These findings provide valuable insights for food policymakers seeking to stimulate a shift in dietary consumption towards sustainable healthy patterns and also contribute to the emerging research on consumer behaviour regarding sustainable healthy diets.

## 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

XC: Conceptualization, Investigation, Supervision, Visualization, Writing – original draft, Writing – review & editing. XJ: Data curation, Investigation, Methodology, Software, Writing – original draft. LW: Funding acquisition, Project administration, Supervision, Validation, 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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## Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsufs.2023.1269242/full#supplementary-material

## References

Ahmed, N., Li, C., Khan, A., Qalati, S. A., Naz, S., and Rana, F. (2021). Purchase intention toward organic food among young consumers using theory of planned behavior: role of environmental concerns and environmental awareness. *J. Environ. Plann. Manag.* 64, 796–822. doi: 10.1080/09640568.2020.1785404

Ajzen, I., (1985). *From intention to actions: A theory of planned behavior*. Berlin: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* 50, 179–211. doi: 10.1016/0749-5978(91)90020-T

Albertsen, L., Wiedmann, K.-P., and Schmidt, S. (2020). The impact of innovation-related perception on consumer acceptance of food innovations–development of an integrated framework of the consumer acceptance process. *Food Qual. Prefer.* 84:e103958. doi: 10.1016/j.foodqual.2020.103958

Al-Swidi, A., Mohammed, R. S., Haroon Hafeez, M., and Noor Mohd, S. M. (2014). The role of subjective norms in theory of planned behavior in the context of organic food consumption. *Brit. Food J.* 116, 1561–1580. doi: 10.1108/BFJ-05-2013-0105

Arora, A., Rani, N., Devi, C., and Gupta, S. (2022). Factors affecting consumer purchase intention of organic food through fuzzy AHP. *Int. J. Qual. Reliab. Manag.* 39, 1085–1103. doi: 10.1108/IJQRM-01-2021-0019

Bagozzi, R. P., and Yi, Y. (1988). On the evaluation of structural equation models. *J. Acad. Mark. Sci.* 16, 74–94. doi: 10.1007/BF02723327

Bamberg, S., and Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behaviour. *J. Environ. Psychol.* 27, 14–25. doi: 10.1016/j.jenvp.2006.12.002

Barbour, L. R., Woods, J. L., and Brimblecombe, J. K. (2023). Perseverance, partnerships and passion: ingredients for successful local government policy to promote healthy and sustainable diets. *BMC Public Health* 23:1762. doi: 10.1186/s12889-023-16656-x

Baur, I., Stylianou, K. S., Ernstoff, A., Hansmann, R., Jolliet, O., and Binder, C. R. (2022). Drivers and barriers toward healthy and environmentally sustainable eating in Switzerland: linking impacts to intentions and practices. *Front. Sustain. Food Syst.* 6:808521. doi: 10.3389/fsufs.2022.808521

Benedetti, I., Laureti, T., and Secondi, L. (2018). Choosing a healthy and sustainable diet: a three-level approach for understanding the drivers of the Italians' dietary regime over time. *Appetite* 123, 357–366. doi: 10.1016/j.appet.2018.01.004

Biasini, B., Rosi, A., Giopp, F., Turgut, R., Scazzina, F., and Menozzi, D. (2021). Understanding, promoting and predicting sustainable diets: a systematic review. *Trends Food Sci. Technol.* 111, 191–207. doi: 10.1016/j.tifs.2021.02.062

Blackstone, N. T., El-Abbadi, N. H., McCabe, M. S., Griffin, T. S., and Nelson, M. E. (2018). Linking sustainability to the healthy eating patterns of the dietary guidelines for Americans: a modelling study. *Lancet Planet. Health* 2, e344–e352. doi: 10.1016/S2542-5196(18)30167-0

Camilleri, A. R., Larrick, R. P., Hossain, S., and Patino-Echeverri, D. (2019). Consumers underestimate the emissions associated with food but are aided by labels. *Nat. Clim. Change* 9, 53–58. doi: 10.1038/s41558-018-0354-z

Carfora, V., Cavallo, C., Caso, D., del Giudice, T., de Devitiis, B., Viscecchia, R., et al. (2019). Explaining consumer purchase behavior for organic milk: including trust and green self-identity within the theory of planned behavior. *Food Qual. Pref.* 76, 1–9. doi: 10.1016/j.foodqual.2019.03.006

Chakraborty, I., Hu, P. J. H., and Cui, D. (2008). Examining the effects of cognitive style in individuals' technology use decision making. *Decis. Support. Syst.* 45, 228–241. doi: 10.1016/j.dss.2007.02.003

Chen, C., Chaudhary, A., and Mathys, A. (2022). Dietary change and global sustainable development goals. *Front. Sustain. Food Syst.* 6:771041. doi: 10.3389/fsufs.2022.771041

Cheung, M. F. Y.To, W.M (2019). An extended model of value-attitude-behavior to explain Chinese consumers' green purchase behavior. *J. Retail. Consum. Serv.* 50, 145–153. doi: 10.1016/j.jretconser.2019.04.006

Chin, W. W., Gopal, A., and Salisbury, W. D. (1997). Advancing the theory of adaptive structuration: the development of a scale to measure faithfulness of appropriation. *Inform. Syst. Res.* 8, 342–367. doi: 10.1287/isre.8.4.342

Claessens, I., Gillebaart, M., and de Ridder, D. (2023). Personal values, motives, and healthy and sustainable food choices: examining differences between home meals and restaurant meals. *Appetite* 182:106432. doi: 10.1016/j.appet.2022.106432

Cummings, K. M., and Proctor, R. (2014). The changing public image of smoking in the United States: 1964–2014. *Cancer Epidemiol. Biomark. Prev.* 23, 32–36. doi: 10.1158/1055-9965.EPI-13-0798

De Koning, J. I. J. C., Crul, M. R. M., Wever, R., and Brezet, J. C. (2015). Sustainable consumption in Vietnam: an explorative study among the urban middle class. *Int. J. Consum. Stud.* 39, 608–618. doi: 10.1111/ijcs.12235

de Medeiros, J. F., Ribeiro, J. L., and Cortimiglia, M. N. (2016). Influence of perceived value on purchasing decisions of green products in Brazil. *J. Clean. Prod.* 110, 158–169. doi: 10.1016/j.jclepro.2015.07.100

De Schutter, O., Jacobs, N., and Clément, C. (2020). A 'common food policy' for Europe: how governance reforms can spark a shift to healthy diets and sustainable food systems. *Food Policy* 96:101849. doi: 10.1016/j.foodpol.2020.101849

Dean, M., Raats, M. M., and Shepherd, R. (2012). The role of self-identity, past behavior, and their interaction in predicting intention to purchase fresh and processed organic food. *J. Appl. Social Psychol.* 42, 669–688. doi: 10.1111/j.1559-1816.2011.00796.x

Dunlap, R. E., and Jones, R. (2002). "Environmental concern: Conceptual and measurement issues" in *Handbook of Environmental Sociology*. eds. R. E. Dunlap, W. Michelson and C. T. Westport (London: Greenwood press), 482–524.

Dunn, K. I., Mohr, P., Wilson, C. J., and Wittert, G. A. (2011). Determinants of fast-food consumption. An application of the theory of planned behaviour. *Appetite* 57, 349–357. doi: 10.1016/j.appet.2011.06.004

Espinosa, A. (2021). Health behaviors, self-rated health, and health consciousness among Latinx in new York City. *J. Immigr. Minor. Health* 23, 591–596. doi: 10.1007/s10903-020-01053-yt

FAO and WHO. (2019). *Sustainable healthy diets: Guiding principles*. Rome: FAO and WHO.

Fiandari, Y. R., Surachman, S., Rohman, F., and Hussein, A. S. (2019). Perceived value dimension in repetitive fish consumption in Indonesia by using an extended theory of planned behavior. *Br. Food J.* 121, 1220–1235. doi: 10.1108/BFJ-07-2018-0429

Fink, L., Strassner, C., and Ploeger, A. (2021). Exploring external factors affecting the intention-behavior gap when trying to adopt a sustainable diet: a think aloud study. *Front. Nutr.* 8:511412. doi: 10.3389/fnut.2021.511412

Fisher, R. J. (1993). Social desirability bias and the validity of indirect questioning. *J. Consum. Res.* 20, 303–315. doi: 10.1086/209351

Fornell, C., and Wernerfelt, B. (1987). Defensive marketing strategy by customer complaint management: a theoretical analysis. *J. Mark. Res.* 24, 337–346. doi: 10.1177/002224378702400401

Gao, B., Li, Z., and Yan, J. (2022). The influence of social commerce on eco-friendly consumer behavior: technological and social roles. *J. Consum. Behav.* 21, 653–672. doi: 10.1002/cb.2022

Gonera, A., Svanes, E., Bugge, A. B., Hatlebakk, M. M., Prexl, K. M., and Ueland, Ø. (2021). Moving consumers along the innovation adoption curve: a new approach to accelerate the shift toward a more sustainable diet. *Sustainability* 13:4487. doi: 10.3390/su13084477

Hair, J. F., Risher, J. J., Sarstedt, M., and Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* 31, 2–24. doi: 10.1108/EBR-11-2018-0203

Harman, H. H. (1976). *Modern factor analysis*, *3rd Edn.* University of Chicago Press, Chicago.

Harrison, M. R., Palma, G., Buendia, T., Bueno-Tarodo, M., Quell, D., and Hachem, F. (2022). A scoping review of indicators for sustainable healthy diets. *Front. Sustain. Food Syst.* 5:822263. doi: 10.3389/fsufs.2021.822263

Honkanen, P., Olsen, S. O., and Verplanken, B. (2005). Intention to consume seafood—the importance of habit. *Appetite* 45, 161–168. doi: 10.1016/j.appet.2005.04.005

Hu, L., and Bentler, P. M. (1998). Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification. *Psychol. Methods* 3, 424–453. doi: 10.1037/1082-989X.3.4.424

Hwang, A., Francesco, A. M., and Kessler, E. (2003). The relationship between individualism-collectivism, face, and feedback and learning processes in Hong Kong, Singapore, and the United States. *J. Cross-Cult. Psychol.* 1, 72–91. doi: 10.1177/0022022102239156

Jalil, A., Tasoff, J., and Bustamante, A. (2020). Eating to save the planet: evidence from a randomized controlled trial using individual-level food purchase data. *Food Policy* 95:101950. doi: 10.1016/j.foodpol.2020.101950

Jamal, A., and Sharifuddin, J. (2014). Perceived value and perceived usefulness of halal labeling: the role of religion and culture. *J. Bus. Res.* 68, 933–941. doi: 10.1016/j.jbusres.2014.09.020

Jarmul, S., Dangour, A. D., Green, R., Liew, Z., Haines, A., and Scheelbeek, P. F. D. (2020). Climate change mitigation through dietary change: a systematic review of empirical and modelling studies on the environmental footprints and health effects of 'sustainable diets'. *Environ. Res. Lett.* 15:123014. doi: 10.1088/1748-9326/abc2f7

Jayanti, R. K., and Burns, A. C. (1998). The antecedents of preventive health care behavior: an empirical study. *J. Acad. Mark. Sci.* 26, 6–15. doi: 10.1177/0092070398261002

Jha, S. S., Dobe, M., Taklikar, C., and Lahiri, A. (2023). School-based intervention on behavioral intention of adolescents regarding healthy diet in India. *Front. Public Health* 11:1094960. doi: 10.3389/fpubh.2023.1094960

Junghans, A. F., Cheung, T. T., and De Ridder, D. D. (2015). Under consumers' scrutiny: an investigation into consumers' attitudes and concerns about nudging in the realm of health behavior. *BMC Public Health* 15:336. doi: 10.1186/s12889-015-1691-8

Kareklas, I., Carlson, J. R., and Muehling, D. D. (2014). "I eat organic for my benefit and yours": egoistic and altruistic considerations for purchasing organic food and their implications for advertising strategists. *J. Advert.* 43, 18–32. doi: 10.1080/00913367.2013.799450

Koklic, M. K., Golob, U., Podnar, K., and Zabkar, V. (2019). The interplay of past consumption, attitudes and personal norms in organic food buying. *Appetite* 137, 27–34. doi: 10.1016/j.appet.2019.02.010

Kramer, E., Knight, E. L., and Bryan, A. (2023). Cooking interventions for improving diet quality among black americans: a randomized controlled trial. *Ann. Behav. Med.* 57, 323–333. doi: 10.1093/abm/kaac058

Kumar, A., Prakash, G., and Kumar, G. (2021). Does environmentally responsible purchase intention matter for consumers? A predictive sustainable model developed through an empirical study. *J. Retail. Consum. Serv.* 58:102270. doi: 10.1016/j.jretconser.2020.102270

Lang, T., and Barling, D. (2013). Nutrition and sustainability: an emerging food policy discourse. *P. Nutr. Soc.* 72, 1–12. doi: 10.1017/S002966511200290X

Leary, M. R. (2004). *Introduction to behavioral research methods*, *4th Edn.*, Pearson, Boston.

Li, L., Bai, Y., Song, Z., Chen, A., and Wu, B. (2018). Public transportation competitiveness analysis based on current passenger loyalty. *Trans. Res. A Policy Pract.* 113, 213–226. doi: 10.1016/j.tra.2018.04.016

Li, S., and Jaharuddin, N. S. (2020). Identifying the key purchase factors for organic food among Chinese consumers. *Front. Bus. Res. China* 14, 1–23. doi: 10.1186/s11782-020-00093-3

Li, L., Long, X., Laubayeva, A., Cai, X., and Zhu, B. (2020). Behavioral intention of environmentally friendly agricultural food: the role of policy, perceived value, subjective norm. *Environ. Sci. Pollut. Res.* 27, 18949–18961. doi: 10.1007/s11356-020-08261-x

Li, W., and Shao, J. (2023). Research on influencing factors of consumers' environmentally friendly clothing purchase behavior -- based on theory of planned behavior and norm activation model. *China Manag. Sci.* doi: 10.16381/j.cnki.issn1003-207x.2022.0070

MacKenzie, S. B. (2001). Opportunities for improving consumer research through latent variable structural equation modeling. *J. Consum. Res.* 28, 159–166. doi: 10.1086/321954

McEachan, R. R. C., Conner, M., Taylor, N. J., and Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the theory of planned behaviour: a meta-analysis. *Health Psychol. Rev.* 5, 97–144. doi: 10.1080/17437199.2010.521684

Nejad, L. M., Wertheim, E. H., and Greenwood, K. M. (2004). Predicting dieting behavior by using, modifying, and extending the theory of planned behavior. *J. Appl. Social Psychol.* 34, 2099–2131. doi: 10.1111/j.1559-1816.2004.tb02692.x

NHSC. (2020). Available at: http://www.scio.gov.cn/xwfbh/xwbfbh/wqfbh/42311/44583/index.htm (Accessed March 8, 2022).

Pagiaslis, A., and Krontalis, A. K. (2014). Green consumption behavior antecedents: environmental concern, knowledge, and beliefs. *Psychol. Mark.* 31, 335–348. doi: 10.1002/mar.20698

Pelle G Hansen, P. G., Schilling, M., and Malthesen, M. (2021). Nudging healthy and sustainable food choices: three randomized controlled field experiments using a vegetarian lunch-default as a normative signal. *J. Public Health* 43, 392–397. doi: 10.1093/pubmed/fdz154

Petrick, J. F., and Backman, S. J. (2002). An examination of the construct of perceived value for the prediction of golf travelers' intention to revisit. *J. Travel Res.* 41, 38–45. doi: 10.1177/004728750204100106

Ploll, U., and Stern, T. (2020). From diet to behaviour: exploring environmental- and animal-conscious behaviour among Austrian vegetarians and vegans. *Br. Food J.* 122, 3249–3265. doi: 10.1108/BFJ-06-2019-0418

Qi, X., and Ploeger, A. (2021). An integrated framework to explain consumers' purchase intention toward green food in the Chinese context. *Food Qual. Prefer.* 92:104229. doi: 10.1016/j.foodqual.2021.104229

Rahamat, S., Jeong, E., Arendt, S. W., and Xu, Y. (2022). Menu labeling influence on purchase behaviors: applying the theory of planned behavior and health consciousness. *Appetite* 172:105967. doi: 10.1016/j.appet.2022.105967

Righi, S., Viganò, E., and Panzone, L. (2023). Consumer concerns over food insecurity drive reduction in the carbon footprint of food consumption. *Sustain. Prod. Consum.* 39, 451–465. doi: 10.1016/j.spc.2023.05.027

Rivis, A., and Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: a meta-analysis. *Curr. Psychol.* 22, 218–233. doi: 10.1007/s12144-003-1018-2

Schwingshackl, L., Watzl, B., and Meerpohl, J. J. (2020). The healthiness and sustainability of national and global food based dietary guidelines: modelling study. *BMJ* 370:m2417. doi: 10.1136/bmj.m2417

Secer, A., Masotti, M., Iori, E., and Vittuari, M. (2023). Do culture and consciousness matter? A study on motivational drivers of household food waste reduction in Turkey. *Sustain. Prod. Consump.* 38, 69–79. doi: 10.1016/j.spc.2023.03.024

Shen, X., Xu, Q., and Liu, Q. (2022). Predicting sustainable food consumption across borders based on the theory of planned behavior: a meta-analytic structural equation model. *PLoS One* 17:e0275312. doi: 10.1371/journal.pone.0275312

Sheng, F., Wang, J., Chen, K. Z., Fan, S., and Gao, H. (2021). Changing Chinese diets to achieve a win–win solution for health and the environment. *China World Econ.* 29, 34–52. doi: 10.1111/cwe.12393

Shukri, M., Jones, F., and Conner, M. (2016). Work factors, work-family conflict, the theory of planned behaviour and healthy intention: a cross-cultural study. *Stress. Health* 32, 559–568. doi: 10.1002/smi.2662

Smith, S., and Paladino, A. (2010). Eating clean and green? Investigating consumer motivations towards the purchase of organic food. *Australas. Mark. J.* 18, 93–104. doi: 10.1016/j.ausmj.2010.01.001

Sobhani, S. R., Rezazadeh, A., Omidvar, N., and Eini-Zinab, H. (2019). Healthy diet: a step toward a sustainable diet by reducing water footprint. *J. Sci. Food Agric.* 99, 3769–3775. doi: 10.1002/jsfa.9591

Sogari, G., Pucci, T., Caputo, V., and van Loo, E. J. (2023). The theory of planned behaviour and healthy diet: examining the mediating effect of traditional food. *Food Qual. Pref.* 104:104709. doi: 10.1016/j.foodqual.2022.104709

Springmann, M., Wiebe, K., Mason-D'Croz, D., Sulser, T. B., Rayner, M., and Scarborough, P. (2018). Health and nutritional aspects of sustainable diet strategies and their association with environmental impacts: a global modelling analysis with country-level detail. *Lancet Planet. Health* 2, e451–e461. doi: 10.1016/S2542-5196(18)30206-7

Steenson, S., and Buttriss, J. L. (2021). Healthier and more sustainable diets: what changes are needed in high-income countries? *Nutr. Bull.* 46, 279–309. doi: 10.1111/nbu.12518

Stein, C. M., Morris, N. J., and Nock, N. L. (2012). Structural equation modeling. *Methods Mol. Biol.* 850, 495–512. doi: 10.1007/978-1-61779-555-8_27

Stranieri, S., Ricci, E. C., and Banterle, A. (2017). Convenience food with environmentally-sustainable attributes: a consumer perspective. *Appetite* 116, 11–20. doi: 10.1016/j.appet.2017.04.015

Sultan, P., Tarafder, T., Pearson, D., and Henryks, J. (2020). Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: moderating roles of communication, satisfaction and trust in organic food consumption. *Food Qual. Pref.* 81:103838. doi: 10.1016/j.foodqual.2019.103838

Sun, Y., Wang, S., Li, J., Zhao, D., and Fan, J. (2017). Understanding consumers' intention to use plastic bags: using an extended theory of planned behaviour model. *Nat. Hazards* 89, 1327–1342. doi: 10.1007/s11069-017-3022-0

Suttikun, C. (2023). "Where should we eat?": how health consciousness moderates the influences driving intention to purchase healthy food. *J. Int. Food Agribus. Mark.* 35, 183–211. doi: 10.1080/08974438.2021.1980756

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res. Sci. Educ.* 48, 1273–1296. doi: 10.1007/s11165-016-9602-2

Tang, D., Cai, X., Nketiah, E., Adjei, M., Adu-Gyamfi, G., and Obuobi, B. (2023). Separate your waste: a comprehensive conceptual framework investigating residents' intention to adopt household waste separation. *Sustain. Prod. Consump.* 39, 216–229. doi: 10.1016/j.spc.2023.05.020

Teisl, M. F., Noblet, C. L., and Rubin, J. (2009). The psychology of eco-consumption. *J. Agric. Food Ind. Organ.* 7:1268. doi: 10.2202/1542-0485.1268

Thaler, R. H., and Sunstein, C. R. (2008). Easy does it: how to make lazy people do the right thing. *New Republic* 238:20.

The 14th Five-Year Plan and 2035 Vision Plan. (2021). *Vision plan, 2021*. Available at: https://www.gov.cn/xinwen/2021-03/13/content_5592681.htm (Accessed January 3, 2023).

Timm, N. H. (2002). *Applied multivariate analysis*. New York: Springer.

Trafimow, D., and Finlay, K. A. (1996). The importance of subjective norms for a minority of people: between subjects and within-subjects analyses. *Pers. Soc. Psychol. Bull.* 22, 820–828. doi: 10.1177/0146167296228005

United Nations. (2015). *Sustainable development GOALS*. Available at: https://www.un.org/sustainabledevelopment/sustainable-development-goals/ (Accessed July 1, 2023).

Vallejos, B. T., Engler, P. A., Nahuelhual, L., and Gelcich, S. (2023). From past behavior to intention: using the theory of planned behavior to explore noncompliance in small-scale fisheries. *Ocean Coast. Manag.* 239:106615. doi: 10.1016/j.ocecoaman.2023.106615

Van Loo, E. J., Hoefkens, C., and Verbeke, W. (2017). Healthy, sustainable and plant-based eating: perceived (mis) match and involvement-based consumer segments as targets for future policy. *Food Policy* 69, 46–57. doi: 10.1016/j.foodpol.2017.03.001

Verain, M. C. D., Sijtsema, S. J., Dagevos, H., and Antonides, G. (2017). Attribute segmentation and communication effects on healthy and sustainable consumer diet intention. *Sustainability* 9:743. doi: 10.3390/su9050743

Visschers, V., Wickli, N., and Siegrist, M. (2016). Sorting out food waste behaviour: a survey on the motivators and barriers of self-reported amounts of food waste in households. *J. Environ. Psychol.* 45, 66–78. doi: 10.1016/j.jenvp.2015.11.007

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., et al. (2019). Food in the Anthropocene: the EAT– lancet commission on healthy diets from sustainable food systems. *Lancet* 393, 447–492. doi: 10.1016/S0140-6736(18)31788-4

Yazdanpanah, M., and Forouzani, M. (2015). Application of the theory of planned behaviour to predict Iranian students' intention to purchase organic food. *J. Clean. Prod.* 107, 342–352. doi: 10.1016/j.jclepro.2015.02.071

Yin, J., Zhang, X., Huang, W., Liu, L., Zhang, Y., Yang, D., et al. (2021). The potential benefits of dietary shift in China: synergies among acceptability, health, and environmental sustainability. *Sci. Total Environ.* 779:146497. doi: 10.1016/j.scitotenv.2021.146497

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *J. Mark.* 52, 2–22. doi: 10.1177/002224298805200302

Zhang, W., and Luo, B. (2021). Do environmental concern and perceived risk contribute to consumers' intention toward buying remanufactured products? An empirical study from China. *Clean Techn. Environ. Policy* 23, 463–474. doi: 10.1007/s10098-021-02061-8