Food Research International 237 (2026) 119337

Contents lists available at ScienceDirect

Food Research International

journal homepage: www.elsevier.com/locate/foodres

Understanding healthy eating intentions and behaviour through an extended theory of planned behaviour: the role of sustainability beliefs

Elena Radicioni, Leonardo Casini, Tommaso Fantechi *

Department of Agriculture, Food, Environment and Forestry, University of Florence, Piazzale delle Cascine, 18, 50144 Florence, Italy

ARTICLE INFO

Keywords:
Theory of planned behaviour
Sustainability beliefs
Perceived behavioural control
Healthy eating
PLS-SEM

ABSTRACT

Healthy eating represents a central objective for public health policies and is increasingly framed as a key pillar of sustainable development. Despite this growing convergence, empirical research grounded in behavioural theories has rarely integrated sustainability-related motivations into explanatory models of healthy dietary behaviour. This study addresses this gap by extending the Theory of Planned Behaviour (TPB) through a multicomponent conceptualisation of perceived behavioural control and the explicit inclusion of healthy diet sustainability beliefs as an additional value-based determinant of healthy eating intention. Drawing on data from a representative sample of 1000 Italian consumers, the proposed framework is tested through Partial Least Squares Structural Equation Modelling. The findings confirm the robustness of the TPB in explaining healthy eating intentions, with attitude and subjective norm emerging as the strongest predictors. Sustainability beliefs of healthy eating significantly enhance intention to eat healthily, underscoring the relevance of environmental concerns in shaping dietary goals. At the same time, actual eating behaviour is strongly shaped by practical and contextual factors, including cooking skills, nutrition knowledge, self-control, financial resources, and time pressure. Notably, quadratic effects emerge for cooking skills and time constraints, suggesting non-linear relationships with healthy eating behaviour. Overall, the findings highlight the importance of combining sustainability motivational drivers with enabling conditions to promote healthy and sustainable diets. By jointly examining sustainability beliefs and behavioural constraints, these findings refine behavioural models of food choice and offer a stronger evidence base for designing integrated public health, sustainability, and food-system interventions.

1. Introduction

Healthy eating remains a central public health priority, despite decades of policies and interventions aimed at improving population diets. International organisations have increasingly framed dietary change not only as a health issue but also as a sustainability challenge. In 2019, the FAO and WHO introduced the Guiding Principles for Sustainable Healthy Diets, defining them as dietary patterns that promote health and well-being, have low environmental impact, are accessible, affordable, safe, equitable, and culturally acceptable (FAO & WHO, 2019). This integrated perspective closely aligns with the holistic principles of the One Health approach, which recognizes the interdependence of human, environmental, and broader ecosystem health (FAO et al., 2022). Healthy eating behaviours offer a useful empirical domain in which these interconnections can be examined, as a large and still growing body of research has examined the determinants of healthy eating, ranging from individual-level psychological factors (e.g., Allen et al., 2024; Esposito et al., 2021; Keller & Siegrist, 2015; Xin & Seo, 2020) to broader socioeconomic and environmental influences (e.g., da Costa et al., 2022; de Menezes et al., 2018; Li et al., 2019; Zorbas et al., 2018). This line of inquiry is particularly relevant in light of ongoing changes in food environments and consumption patterns, which are being reshaped both by evolving consumer demand and by transformations in the food supply (Reinhardt et al., 2024). Continued investigation into the factors that most strongly promote or hinder healthy eating is therefore essential for developing effective strategies to encourage healthier dietary choices at scale.

Within this context, the Theory of Planned Behaviour (TPB, Ajzen, 1985; Ajzen, 1991) has become one of the most widely used frameworks for explaining and predicting healthy eating intentions and behaviours. By focusing on attitude, subjective norm and perceived behavioural control (PBC) as proximal determinants of intention, and on intention as

* Corresponding author.
E-mail addresses: elena.radicioni@unifi.it (E. Radicioni), leonardo.casini@unifi.it (L. Casini), tommaso.fantechi@unifi.it (T. Fantechi).

https://doi.org/10.1016/j.foodres.2026.119337
Received 6 February 2026; Received in revised form 13 April 2026; Accepted 29 April 2026
Available online 4 May 2026

the immediate antecedent of behaviour, TPB offers a structured lens for understanding why people do or do not adhere to healthy dietary patterns. Numerous studies and meta-analyses have confirmed that positive attitude towards healthy eating, supportive social expectations and higher perceived control are associated with stronger intentions to eat healthily and, to a moderate degree, with healthier self-reported diets (Biasini et al., 2021; Li et al., 2019; McDermott et al., 2015; Riebl et al., 2015). More recently, a multicomponent extension of TPB has been proposed, in which global constructs such as PBC are unpacked into specific subcomponents allowing a more fine-grained analysis of the practical conditions that support or constrain healthy eating (Contini et al., 2020; Nystrand & Olsen, 2020; Rhodes et al., 2006).

Public health and sustainability objectives have become progressively integrated, as dietary patterns that promote human health are often aligned with environmental sustainability goals (FAO & WHO, 2019; FAO et al., 2022). Nevertheless, health behaviour studies grounded in the TPB have rarely incorporated sustainability-related individual motives into models explicitly targeting healthy dietary behaviour, as most TPB extensions applied to dietary contexts continue to focus predominantly on health-related determinants of healthy eating (see, for example, Brouwer & Mosack, 2015; Canova et al., 2020; Liu et al., 2021). In this regard, it is worth noting that TPB has been recently reconceptualised by Ajzen and Kruglanski (2019) into the Theory of Reasoned Goal Pursuit (TRGP), which proposes that attitudes and subjective norms influence behaviour only to the extent that the underlying beliefs correspond to currently active procurement and approval goals.

Consistent with prior research, the present study adopts PBC conceptualizations that reflect how the TPB framework proposed by Rhodes et al. (2006) has been applied and adapted in the existing literature (e.g., Contini et al., 2020; Fantechi et al., 2024; Nystrand & Olsen, 2020). This approach allowed us to more finely model healthy eating intentions and behaviour, while explicitly incorporating sustainability-related beliefs associated with healthy eating as a direct determinant of intention. Following this conceptual framework, PBC is operationalized through subcomponents. At the same time, the TPB framework is extended, integrating sustainability beliefs[1] related to adherence to healthy diets as an additional, health-relevant determinant. By jointly modelling these components, the study aims to provide a more comprehensive understanding of the determinants of healthy eating in a context where health and sustainability goals increasingly intersect.

The paper first reviews the existing literature on the topic, providing the foundation for the development of the hypotheses, then tested within the proposed theoretical framework. The methodological aspects of the study, including the application of PLS-SEM, are then described. The results are subsequently presented and discussed, followed by the derived conclusions and implications from the study.

2. Theory and hypotheses development

Within research examining the determinants of healthy diets, numerous studies have drawn on the well-established TPB (Ajzen, 1985; Ajzen, 1991) to examine the key determinants of eating-related decision-making and behaviour in everyday life (Biasini et al., 2021; Li et al., 2019; McDermott et al., 2015; Riebl et al., 2015). Through the direct assessment of its theoretical constructs, the theory facilitates the prediction of consumer intentions and behaviour related to food consumption (Ajzen, 2015), with intention serving as the immediate antecedent of behaviour. Intention is, in turn, shaped by three core components: attitude towards healthy food consumption, subjective norm concerning the pressure of others' expectations, and PBC over one's ability to choose and maintain a healthy diet. The TPB has been widely applied due to its relatively strong explanatory power, with meta-analytic evidence indicating that it explains approximately 40–49% of the variance in intentions to perform a specific behaviour and 26–36% of the variance in actual behavioural adherence (McEachan et al., 2016).

The theory posits that a positive attitude towards a healthy eating behaviour, along with favourable subjective norm reflecting perceived social approval, enhance individuals' intentions to perform it (Conner et al., 2002). Consistent with this, several empirical studies show that people who experience supportive social pressure and hold a positive attitude towards healthy eating report higher intentions to comply with the healthy eating behaviour and greater improvements in their eating patterns over time (Fila & Smith, 2006; Li et al., 2019; McDermott et al., 2015). Taken together, theoretical assumptions and prior empirical evidence lead to the following hypotheses:

H1: Positive attitude towards healthy eating is positively related to the intention of eating healthily.

H2: The pressure of perceived social approval to comply with healthy eating behaviour (i.e., subjective norm) is positively related to the intention to eat healthily.

The inclusion of PBC was a key innovation introduced when the original Theory of Reasoned Action (Ajzen, 1985) was extended into the TPB, as it explicitly accounts for factors that fall outside individuals' full volitional control. According to the TPB, PBC is theoretically expected to moderate the effects of attitude and subjective norm on intention, meaning that the influence of attitudes and norms on behavioural intentions may vary depending on how much control individuals perceive themselves to have (La Barbera & Ajzen, 2020). In practice, however, empirical investigations have more consistently revealed direct main effects of PBC as an independent determinant of intention (Hamilton et al., 2024). In general, higher levels of perceived control, abilities, and resources increase both the likelihood of forming intentions and the successful enactment of the behaviour (Ajzen, 1991).

The decomposition of PBC into sub-dimensions is informed by previous theoretical approaches. Already in Ajzen's (1991) formulation of the TPB, perceived behavioural control is explicitly distinguished from the concept of perceived locus of control proposed by Rotter (1966). While locus of control refers to relatively stable expectations about whether outcomes are determined by internal or external forces, PBC is conceived as a more context-specific perception of the ease or difficulty of performing a particular behaviour. Consequently, PBC may vary across situations and behavioural domains depending on the skills, resources, and opportunities individuals perceive as available to them. In the context of dietary behaviour, distinguishing between different components of perceived control allows the model to capture meaningful differences in how individuals experience control over their behaviour, which may not be fully reflected by a single global PBC indicator. Moreover, in their meta-analysis, Hagger et al. (2022) highlight the considerable complexity of PBC within the TPB framework, both in terms of measurement and variability in its moderating effects. This provides further rationale for decomposing PBC into multiple constructs to better capture its nuanced role in predicting health behaviour. In line with this, Rhodes et al. (2006) proposed a multicomponent extension of the TPB in response to a limitation in TPB-based research, whereby early measurements of latent constructs are often treated as if they fully capture the constructs themselves. Over time, these initial operationalisations may have become taken for granted and applied uncritically, potentially constraining theoretical development and limiting the ability to capture more complex underlying concepts. Following the proposed extension, the intention's predictors are no longer treated as a single, global construct but are unpacked into distinct components. The multicomponent framework has served as the theoretical basis for several recent studies in the field of food consumer science (e.g., Contini et al., 2020; Fantechi et al., 2024; Nystrand & Olsen, 2020), which follow the decomposition logic of the core constructs. The convergence of these independent applications in closely related research domains

[1] Throughout the article, the term “sustainability beliefs” implicitly refers to sustainability-related beliefs specifically associated with healthy eating.

constitutes meaningful empirical support for the approach. Here, PBC is identified in subcomponents within the domains of skills and abilities, resources, and opportunities for performing a specific behaviour.

The skills and abilities subcomponent refers to those perceived capabilities that allow compliance with the behaviour. In the context of healthy eating, a substantial body of literature highlights the importance of cooking skills in supporting the adoption of a healthy diet. A lack of cooking skills is systematically associated with overconsumption of convenience and processed foods (Contini et al., 2018), which are commonly considered unhealthy dietary choices (Fiolet et al., 2018; Pagliai et al., 2021). On the other hand, people who feel confident in their cooking skills are typically better equipped to maintain a healthy eating pattern, because this confidence translates into greater use of home cooking, more frequent preparation of meals from basic ingredients, and higher overall diet quality (Garcia et al., 2016). Studies consistently show that higher cooking or food-preparation skills and stronger food-skills confidence are associated with healthier dietary behaviours, such as greater fruit and vegetable intake and better adherence to dietary guidelines (Hagmann et al., 2020; Mengi Çelik et al., 2023). Considering the supporting literature and in line with Contini et al. (2020), we conceptualize this construct as a skills- and abilities-related subcomponent of PBC. Accordingly, we hypothesize that:

H3. Cooking skills are positively related to both healthy eating intentions (a) and behaviours (b).

Beyond cooking skills, self-regulatory capacity in eating plays a central role in supporting healthy dietary behaviours. Impulsive eating tendencies are particularly relevant in modern food environments, where highly palatable and energy-dense foods are readily available and strongly cue-driven (Burke & Small, 2016). In such contexts, individuals are more likely to prioritize immediate enjoyment over restraint, thereby reducing their ability to form and maintain clear intentions to eat healthily (Stroebe, 2022). Evidence from eating self-control research indicates that limited ability to regulate one's own eating choices undermines both the intention to follow a healthy diet and the capacity to adhere to it over time (Mann & Ward, 2025). This suggests a positive relationship between eating self-control, conceptualised as the ability to consistently enact a healthy diet, and healthy eating intentions and behaviours. Formally:

H4: Eating self-control is positively related to both healthy eating intentions (a) and behaviours (b).

The resources subcomponent refers to individuals' perceived availability of the means needed to perform the behaviour, encompassing both material and immaterial factors. Economic resources seem to be a key factor in the adoption of recommended dietary patterns (van der Velde et al., 2022), and consumers usually perceive following dietary guidelines as more expensive than eating less healthily (Daniel, 2020). From this perspective, perceiving that one has enough money available contributes to a sense of security and control in pursuing a healthy diet, because adequate financial resources are seen as a necessary condition for regularly purchasing and consuming healthier foods (Contini et al., 2020). On this basis, we propose the following hypothesis:

H5. Higher perceived financial resources are positively related to both healthy eating intentions (a) and behaviours (b).

While the availability of money represents a material resource, healthy eating also depends on immaterial resources. Self-assessed knowledge about healthy eating patterns can be viewed as a perceived cognitive resource, because it provides the informational basis needed to recognise and select healthy options in everyday food decisions. A large body of research shows that nutrition knowledge and food literacy are key enablers of healthier dietary patterns, as they support better food choices and greater adherence to dietary guidelines (Aureli & Rossi, 2022; Roseman et al., 2017; Scalvedi et al., 2021). Accordingly, we anticipate the following relationship:

H6. Healthy eating subjective knowledge is positively related to both healthy eating intentions (a) and behaviours (b).

Time availability is a situational factor that can represent a situational constraint (opportunity) to adherence to a healthy diet. When time is limited, individuals are more likely to engage in unhealthy eating patterns and lifestyle behaviours. Venn and Strazdins (2017) report that perceived time scarcity is associated with poorer dietary choices. In particular, lack of time encourages reliance on convenient, highly processed foods and less deliberate food decisions, often resulting in increased consumption of sugar-sweetened beverages and a reduced intake of fruits and vegetables (Alm & Olsen, 2017). Consistently, Biasini et al. (2023) report that limited free time has also been identified as one of the most relevant beliefs correlated with intention and behaviour in the adoption of sustainable diets in an Italian sample. These findings lead to the following hypothesis:

H7. Time pressure is negatively related to both healthy eating intentions (a) and behaviours (b).

Healthy diet sustainability-related beliefs can be anticipated as an additional positive driver of intention to eat healthily. Evidence from several streams of literature supports the idea that caring about environmental or ethical aspects of food often goes hand-in-hand with healthier dietary orientations. Studies on sustainable diets further show that individuals sensitive to environmental and climate issues tend to report higher diet quality, including greater alignment with dietary guidelines and healthier food choices (Baur et al., 2022). Similarly, Arrazat et al. (2024) concluded that enhancing environmental knowledge promotes both healthy and sustainable diets. Furthermore, recent contributions explicitly link environmental and health motives within the same dietary framework. Research on "sustainable healthy diets" indicates that individuals who endorse both health and sustainability goals are more likely to intend to adopt (Chen et al., 2024) and actually follow recommended dietary patterns (Slotnick et al., 2024).

From a theoretical perspective, however, sustainability-related beliefs are expected to influence behaviour primarily indirectly through behavioural intentions. Within the TPB, value-based or normative motivations directly shape behavioural intentions, which in turn constitute the most proximal predictor of behaviour (Ajzen, 1985). In addition, research on sustainable consumption consistently documents a value-action gap (or "green gap"), whereby pro-environmental attitudes and beliefs translate more likely into intentions than into consistent behavioural change, due to contextual constraints, habits, and situational factors (ElHaffar et al., 2020; Essiz et al., 2023). In addition, the recent reconceptualization of TPB through the TRGP (Ajzen and Kruglanski, 2019) posits that attitudes and subjective norms influence behaviour only when the underlying beliefs correspond to currently active goals. Empirical applications of TRGP in both general and dietary contexts (Hamilton et al., 2024; Menozzi et al., 2025) indicate that health- and environment-related considerations act as goal-related contexts, influencing when existing behavioural and normative beliefs guide the formation of intentions. Accordingly, sustainability beliefs are expected to strengthen individuals' intention to eat healthily, while their effect on actual behaviour is likely to be indirect, through intention.

Taken together, this literature supports the hypothesis that the healthy diet sustainability-related beliefs are positively and directly associated with the intention to eat healthily.

H8. Healthy diet sustainability beliefs are positively related to healthy eating intentions.

Within the TPB theoretical framework, the key proximal predictor of healthy eating behaviour is the intention to eat healthily. A positive relationship between intention to eat healthily and actual healthy eating behaviour is well documented in TPB studies and meta-analyses (Li et al., 2019; McDermott et al., 2015). Recent studies have reinforced these findings, with Ashrafi et al. (2023) showing that behavioural intention is the strongest determinant of healthy eating behaviour among adolescents. Grounded in the robust TPB theoretical framework and supported by existing empirical evidence, the following hypothesis is advanced:

H9: The intention of eating healthily is positively related to healthy eating behaviour.

Given robust evidence that sociodemographic characteristics influence healthy eating behaviours in distinct ways, these variables were included as essential control variables in our model. Survey-based studies report gender differences in diet quality and adherence to dietary guidelines, typically with women showing healthier patterns than men (H10a) (Ares et al., 2025; Fantechi et al., 2024; Fenton et al., 2024). Age is consistently related to dietary patterns and diet quality indicators. Older adults tend to have better compliance with dietary guidelines and higher recommended food scores, whereas younger adults more frequently follow energy-dense and less healthy patterns (H10b) (Alkerwi et al., 2015). Additionally, education level is widely regarded as a proxy for nutritional literacy (Ferreira et al., 2024), so individuals with higher educational attainment are expected to demonstrate healthier eating patterns (H10c). Furthermore, larger family size is associated with more structured family mealtime routines (e.g., frequent shared meals and a positive mealtime atmosphere) and, consequently, with healthier eating patterns (H10d) (Dallacker et al., 2019; de Souza et al., 2023).

Fig. 1 provides a graphical summary of the hypothesised relationships among these factors, as grounded in the existing literature.

3. Methodology

3.1. Sample

The data used to test the model outlined in the theoretical background were collected through an online questionnaire administered by a professional market research company (Toluna, Inc., Wilton, CT, USA) and disseminated online to its proprietary panel in late 2024. As requested, the sample is representative of the Italian population in terms of age, gender and geographical area of residence. Representativeness quotas were defined based on 2024 ISTAT (2025) data. The final sample consists of 1000 consumers (see Table 1). The questionnaire complies with the Declaration of Helsinki and has received approval from the Ethics Committee of the University of Florence.

3.2. The questionnaire

The questionnaire was organised into three sections, in line with the research aim and research question. In the first section, respondents indicated their frequency of consumption of foods typical of the Italian diet: pasta or rice, vegetables, fruit, cheese, red meat, white meat, sweets, fish and legumes. Frequencies were reported either on a daily scale (for staple foods like pasta, vegetables, fruit) or on a weekly basis for the other foods.

The second section assessed the psychographic latent constructs included in the model. It covered the classic TPB constructs (attitude, subjective norm, and intention), the multicomponent PBC (cooking skills and eating self-control as skills; healthy eating subjective knowledge as resources; and time pressure as an opportunity), and the additional construct that allowed us to further expand the TPB

Table 1
Sample characteristics in relation to the Italian population (ISTAT, 2025).

Variables	Sample	Italian population
Gender		
Men	488 (49%)	49%
Women	512 (51%)	51%
Age		
18–34	239 (24%)	24%
35–50	291 (29%)	29%
51–75	470 (47%)	47%
Region		
North	442 (44%)	45%
Central Italy	207 (21%)	20%
South and Island	351 (35%)	35%

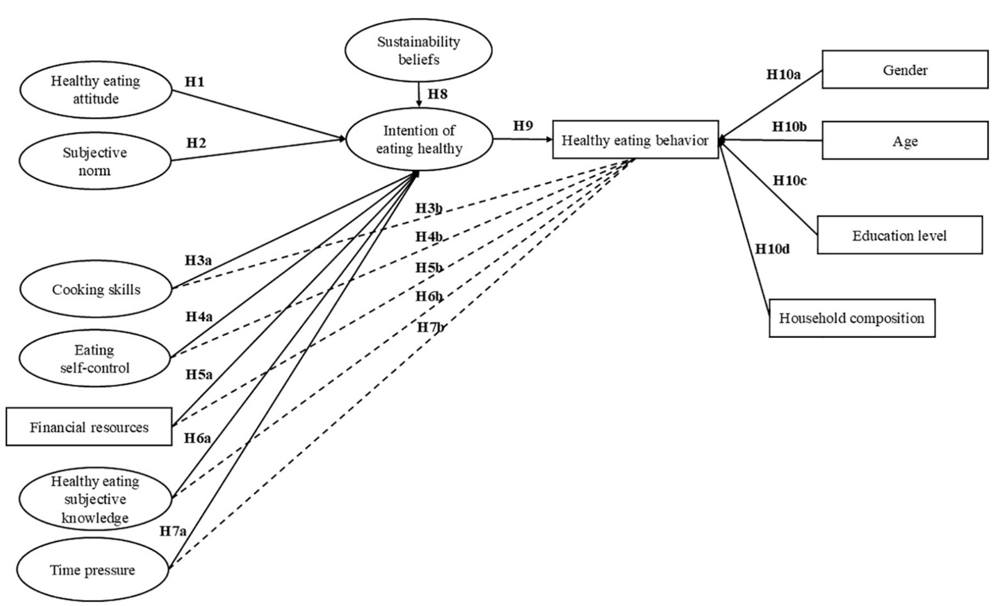

Fig. 1. Hypotheses visualization summary.

(sustainability beliefs). Although this operationalisation represents a partial decomposition of the original PBC construct, it allows for a more detailed assessment of perceived constraints and facilitating conditions related to dietary change. All items (Table 2) were measured on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). In line with the Theory of Planned Behaviour, intention items specified the target and action components of healthy diet adoption. Given the habitual nature of dietary behaviour, time and contextual elements were formulated at a general level in order to capture a stable behavioural orientation rather than a single discrete act.

Traditional evaluative measures of attitude, typically based on judgments of desirability or positivity, may exhibit limited explanatory power in the context of healthy eating. This is because the normative value of healthy eating is widely shared, which may lead to ceiling effects and reduced variability in purely reflective attitudinal items. As a result, such measures may display limited discriminant capacity and diminished ability to account for differences in food-related intentions and behaviours (Grunert et al., 2012; Roininen et al., 1999). Empirical research in the food domain suggests that when evaluative attitudes are normatively consolidated, internal orientations such as motivation, personal relevance and ingrained behavioural dispositions may provide more informative insights into dietary choices than explicit evaluative judgments alone (Hung et al., 2017). In this context, habit can be interpreted as the behavioural manifestation of an internalised attitudinal orientation, reflecting the extent to which healthy eating has become automatic, routine and integrated into one's self-concept. We do not conceptualize habit as a substitute for attitude, but as a behavioural manifestation of a deeply internalised attitudinal orientation in domains characterised by strong normative consensus. This approach is consistent with theoretical accounts that define habits as stable psychological dispositions guiding behaviour with minimal conscious deliberation (Verplanken & Orbell, 2003) and allows us to capture attitudinal differences that may not be observable through traditional evaluative measures alone.

The questionnaire concluded with the collection of information on sociodemographic characteristics. These include age, gender, household size and education, which were used as control variables in the model. Additionally, information on financial resources allocated to food expenditure was collected through a single item (i.e., observed variable), used as an additional resource indicator within perceived behavioural control. The sample distribution for household size, education, and financial resources is reported in Table 3.

3.3. Modelling framework

To estimate the extended TPB, we applied a Partial Least Squares Structural Equation Modelling (PLS-SEM) approach using SmartPLS 4.1.1 (Ringle et al., 2015). This method is widely used in recent food behaviour research and has proven useful in modelling complex relationships (e.g. Boncompagni et al., 2025; Gerini et al., 2025; Zhang et al., 2026). PLS-SEM analyses complex causal relationships through confirmatory factor analysis for model evaluation and multiple regressions for structural relationships. Unlike covariance-based SEM, PLS-SEM treats constructs as proxies for latent variables and relaxes several traditional constraints, which allows for more robust estimates (Hair et al., 2011; Henseler et al., 2015). All psychographic constructs were modelled as latent variables estimated through their respective reflective (or formative, in the case of behaviour) indicators within the PLS-SEM framework. No composite scores were computed ex ante by averaging item responses; instead, latent variable scores were estimated directly by the PLS algorithm. Given that PLS-SEM is a variance-based approach, it does not require multivariate normality of the observed indicators (Hair et al., 2022), making it suitable for Likert-type data.

Our analysis followed the standard two-step procedure used in SEM. In the first step, we evaluated the measurement model by assessing internal consistency reliability (Cronbach's α and composite reliability,

Table 2
Construct items with respective sources.

Construct	Item	Code	Source
Intention	I intend to follow a healthier diet	INT1	Ajzen & Sheikh, 2013
	I plan to follow a healthier diet.	INT2	
	I will ensure that I follow a healthier diet	INT3	
Attitude	Following a healthy diet is something I do frequently	ATT1	Verplanken & Orbell, 2003
	Following a healthy diet is something I do automatically	ATT2	
	Following a healthy diet is something that makes me feel weird if I do not do it	ATT3	
	Following a healthy diet is something I do without thinking	ATT4	
	Following a healthy diet is something that would require effort not to do it	ATT5	
	Following a healthy diet is something that belongs to my (daily, weekly, monthly) routine	ATT6	
	Following a healthy diet is something I would find hard not to do	ATT7	
	Following a healthy diet is something I have no need to think about doing	ATT8	
	Following a healthy diet is something that's typically "me"	ATT9	
	Following a healthy diet is something I have been doing a long time	ATT10	
Subjective norm	Most people who are important to me think that I should follow a healthier diet	SN1	Ajzen & Sheikh, 2013
	Most people whose opinions I value would approve of my regular eating healthier food	SN2	
	Most of my friends and classmates would be willing to follow a healthier diet	SN3	
Cooking Skills	I can prepare "au gratin potatoes" from scratch	CS1	Brunner et al., 2010
	I can prepare a soup from scratch	CS2	
	I can prepare a sauce from scratch	CS3	
	I can bake a cake from scratch	CS4	
	I can bake bread from scratch	CS5	
Eating self-control	Most of the time I am the first to finish my meal (R)	SC1	Nauta & Derckx, 2007
	Once I have started to indulge myself in eating sweets, I find it very difficult to stop (R)	SC2	
	I very often eat more than what is good for me (R)	SC3	
	With respect to eating and drinking I find it very hard to restrain myself (R)	SC4	
Subjective knowledge	I know pretty much about healthy diets	SK1	Flynn & Goldsmith, 1999
	I do not feel very knowledgeable about healthy diets (R)	SK2	
	Among my circle of friends, I'm one of the "experts" on healthy diets	SK3	
	Compared to most other people, I know less about healthy diets (R)	SK4	
	When it comes to healthy diets, I really don't know a lot (R)	SK5	
Time pressure	I am always looking to save time	TP1	Buckley et al., 2007
	I am often rushing to get everything done	TP2	
	I am always in a rush	TP3	
Sustainability beliefs	Switching to a healthier diet can reduce the amount of chemicals flowing into rivers and lakes	SB1	Kareklas et al., 2014

(continued on next page)

Table 2 (*continued*)

Construct	Item	Code	Source
	Switching to a healthier diet can reduce pollution in the soil	SB2	
	Switching to a healthier diet can reduce the agricultural use of herbicides and pesticides	SB3	
	Switching to a healthier diet can reduce land use and deforestation	SB4	

Note: (R) denotes reverse-coded items.

Table 3
Composition of the sample by household size, education and financial resources.

Variables	Sample
Household size	
1	111 (11%)
2	280 (28%)
3	298 (30%)
4	259 (26%)
5 or more	52 (5%)
Education	
Lower secondary school or below	82 (8%)
Upper secondary school diploma	498 (50%)
Bachelor's degree	138 (14%)
Master's degree or higher	282 (28%)
Financial resources	
There is enough money to buy the food I want	405 (41%)
There is a need to consider prices, limiting some choices in food purchases	483 (48%)
There is a need to carefully consider prices, limiting many choices in food purchases	112 (11%)

Note: For financial resources, the question was: "When you think about the available resources for grocery shopping in your household, which of these descriptions best represents you?"

with a threshold of 0.70), convergent validity (average variance extracted, AVE $>$ 0.50), and discriminant validity using the heterotrait–monotrait ratio (HTMT $<$0.85) (Hair et al., 2022; Henseler et al., 2015). For reflective indicators, outer loadings were required to exceed the recommended threshold of 0.708 (Hair et al., 2022). For the formative construct, convergent validity was assessed through redundancy analysis (correlation $>$0.708), and multicollinearity among formative indicators (outer model) was examined using VIF values below 3, as recommended in the PLS-SEM literature (Hair et al., 2022). In addition, we checked for quadratic effects, unobserved heterogeneity (FIMIX-PLS), and potential endogeneity using the Gaussian Copula approach (Hair et al., 2018; Park & Gupta, 2012; Sarstedt et al., 2020). In the second step, we tested the structural relationships using percentile bootstrapping with 10,000 samples, two-tailed testing and a significance level of 0.10 (Hair et al., 2022).

Because VIF is used in different parts of the PLS-SEM assessment, we adopted threshold values that are standard in the respective contexts. Specifically, for the formative measurement (outer) model we used VIF $<$ 3 to rule out problematic collinearity among formative indicators (Hair et al., 2022). For the structural (inner) model we assessed collinearity among predictor constructs using VIF $<$ 5, as typically recommended for the evaluation of structural relations in PLS-SEM (Hair et al., 2022).

We also examined common method bias, which may occur when the same respondents provide data for both dependent and independent variables (Podsakoff et al., 2012). Following Kock (2015), we applied the full collinearity VIF approach and adopted the conservative threshold of 3.3 to screen for potential common method bias. As an additional check, we performed Harman's single-factor test (Jordan & Troth, 2020), which requires that, in a principal component analysis with an unrotated factor solution, no single factor should explain more than 50% of the total variance. In our analysis, the largest single factor explained only 22% of the variance.

3.4. Operationalisation of behaviour

To include behaviour in our extended TPB model, we relied on the self-reported consumption frequencies provided by respondents. To ensure objective criteria, we referred to the guidelines issued by the Italian public agency for healthy eating (CREA, 2019). The agency provides benchmark thresholds accompanied by textual indications that allow for a certain degree of tolerance. On this basis, we constructed an inverse index for diet quality: it takes the value zero when the consumption frequency matches the CREA threshold, -1 when it falls within the acceptable tolerance range, and $-$ 4 or $-$ 9 when the frequency is clearly misaligned with the recommendations.

A crucial methodological consideration concerns the non-compensatory nature of dietary behaviour. From a nutritional and epidemiological perspective, unhealthy dietary practices cannot be fully offset by the presence of healthy ones, as specific risk factors exert independent and cumulative effects on health outcomes. For instance, excessive consumption of certain foods (e.g., red meat or ultra-processed products) generates health risks that are not neutralised by the avoidance or adequate consumption of other food categories (Fardet & Rock, 2014; Mozaffarian et al., 2011). This perspective contrasts with the compensatory health beliefs often observed at the individual level, whereby people perceive unhealthy behaviours as "compensable" through subsequent healthy actions (Knäuper et al., 2004). However, empirical research shows that such compensatory reasoning may distort the assessment of health-related behaviours and obscure genuine risk patterns (Berli et al., 2014).

To reflect the non-compensatory nature of dietary risk, the behavioural indicators were constructed using a non-linear, quadratic scoring structure. Specifically, deviations from dietary recommendations were coded using increasingly negative values (-1, -4 and $-$ 9): -1 represents the minimal penalty associated with marginal deviations from the guidelines, while larger departures receive a disproportionately higher penalty. This quadratic structure ensures that clearly unhealthy behaviours exert a stronger influence on the aggregate behavioural construct and cannot be mechanically offset by compliance in other food categories. Because any specific penalty function may influence the scale properties of the resulting behavioural indicators, we performed a sensitivity analysis using alternative monotonic penalty functions that remain consistent with the non-compensatory assumption (i.e., functions that preserve or increase the relative penalty for larger departures from recommendations). Specifically, we compared the baseline quadratic coding with a linear specification and more convex alternatives, re-estimating the full PLS-SEM model (including the same bootstrapping routine) under each specification. The criteria adopted for each food category are reported in Table A1 in Appendix A. In the model, dietary behaviour was specified as a formative construct composed of the resulting indicators.

The behavioural indicators were coded so that higher values reflect greater compliance with dietary recommendations (0 = full compliance; more negative values = larger departures). As the behaviour construct is formative, each food-category indicator contributes to the composite conditional on the others; therefore, estimated indicator weights can be positive or negative depending on empirical intercorrelations among dietary indicators. Following PLS-SEM guidelines for formative measurement, we assessed indicator collinearity (VIF), the statistical significance of indicator weights (bootstrapping), and convergent validity via redundancy analysis, rather than internal consistency metrics used for reflective constructs.

4. Results

4.1. Measurement model validation

As described above, the first step of the analysis concerned validating the model, which was assessed through internal consistency reliability, convergent validity, and discriminant validity (Hair et al., 2022). For the reflective constructs, some items (ATT5, ATT7, SC1, CS4, CS5, SK3, SK4) were removed as their outer loadings did not exceed the 0.708 threshold recommended in the literature (Hair et al., 2022). The validation, therefore, proceeded using only the items above this threshold.

Internal consistency was evaluated through Cronbach's α and composite reliability (ρc). In our model, all values exceeded 0.7, which is considered the minimum requirement for a reliable scale (Nunnally, 1978; Sahibzada et al., 2025). Convergent validity was confirmed because all average variance extracted (AVE) values exceeded the minimum recommended level of 0.5. Table 4 reports the values for outer loadings, Cronbach's α, composite reliability and AVE for each construct and its indicators.

For the assessment of discriminant validity, we used the heterotrait–monotrait ratio (HTMT). Values should be below 0.85 (Henseler et al., 2015), a condition that was fully met in our model (Table 5). For completeness, the Fornell–Larcker criterion was also examined and is reported in Appendix A (Table A2); in all cases, the square root of each construct's AVE exceeds its inter-construct correlations, further supporting discriminant validity.

The behavioural component, specified as a formative construct in our model and based on the nine scores derived from consumption frequencies, was validated following the rules of thumb suggested by Hair et al. (2021). The convergent validity of formative constructs was assessed by relating the construct to a variable measuring a similar concept (redundancy analysis). If the correlation exceeds 0.708, as in our case, convergent validity is established.

We then evaluated collinearity among the individual indicators, with VIF values consistently below 3. Finally, through a bootstrap analysis using 10,000 samples and the percentile method to construct confidence intervals, we assessed the statistical significance of the indicator weights. Indicators with non-significant weights were evaluated based on their outer loadings. When the outer loading falls below 0.50, and the indicator weight is non-significant, the indicator should be removed. For this reason, white meat and sweets were removed from the construct, as their indices did not contribute significantly to the formative construct and their outer loadings did not exceed 0.50.

Table 6 reports the retained indicators and their outer weights. As the behavioural construct is specified formatively, weights represent each indicator's conditional contribution to the composite; therefore, negative weights may occur due to intercorrelations among dietary indicators and should not be interpreted as indicating that higher consumption is "healthier". In particular, the negative weight observed for cheese appears to reflect its heterogeneous role within dietary patterns. Unlike red meat, which more clearly identifies less healthy consumption profiles, cheese is consumed across a wider range of diets and does not consistently align with unhealthy behaviour. As a result, cheese exhibits a negative weight once other, more discriminating indicators are taken into account. This pattern may also be consistent with the role of cheese as a potential alternative protein source in diets with lower meat consumption, although this mechanism cannot be directly inferred from the present data.

Alongside the validation of the measurement model, we assessed the overall robustness of our TPB. As recommended in the literature (Hair et al., 2018; Sarstedt et al., 2020), we first examined the presence of potential quadratic effects among the variables. Two quadratic effects emerged: a relationship was observed between cooking skills (one of the skills components of PBC) and behaviour, and another one between time pressure (the opportunity component of PBC) and behaviour. For this reason, from this point onward, results are reported for both the baseline linear model (hereafter, baseline model) and the extended quadratic model (hereafter, extended model).

Table 4
Validity and reliability measurements of the model.

Construct	Code	Cronbach's α	CR (ρc)	AVE	Outer loadings
Intention		0.91	0.94	0.85	
	INT1				0.92
	INT2				0.91
	INT3				0.93
Attitude		0.94	0.95	0.69	
	ATT1				0.87
	ATT2				0.86
	ATT3				0.77
	ATT4				0.75
	ATT6				0.87
	ATT8				0.77
	ATT9				0.86
	ATT10				0.87
Subjective norm		0.73	0.85	0.65	
	SN1				0.76
	SN2				0.86
	SN3				0.78
Cooking Skills		0.81	0.89	0.72	
	CS1				0.88
	CS2				0.89
	CS3				0.77
Eating self-control		0.79	0.87	0.70	
	SC2				0.77
	SC3				0.84
	SC4				0.90
Subjective knowledge		0.72	0.83	0.62	
	SK1				0.79
	SK2				0.79
	SK5				0.79
Time pressure		0.81	0.89	0.73	
	TP1				0.76
	TP2				0.91
	TP3				0.88
Sustainability beliefs		0.92	0.94	0.80	
	SB1				0.90
	SB2				0.90
	SB3				0.90
	SB4				0.89

Note: CR = composite reliability; AVE = average variance extracted.

We also evaluated unobserved heterogeneity. A post hoc power analysis conducted with an effect size of 0.15 and a power level of 80%, following the finite mixture PLS (FIMIX-PLS) procedure (Hair et al., 2018), did not indicate that any specific segment performed better than the full sample. The statistical indicators (AIC3, CAIC, BIC, and the Entropy statistic) provided contrasting signals, suggesting that the model performs more effectively across the whole dataset than on potential latent segments.

Finally, we tested for endogeneity using the Gaussian Copula approach proposed by Park and Gupta (2012). A significant Gaussian Copula would indicate a violation of the normality assumption for the

Table 5
Heterotrait-monotrait ratio matrix.

Construct	Code	1	2	3	4	5	6	7	8	9	10	11	12
Attitude	1	–											
Cooking Skills	2	0.39	–										
Household size	3	0.05	0.04	–									
Age	4	0.02	0.15	0.16	–								
Gender	5	0.08	0.28	0.04	0.01	–							
Eating self-control	6	0.12	0.06	0.08	0.19	0.05	–						
Intention	7	0.47	0.39	0.07	0.02	0.16	0.10	–					
Education	8	0.08	0.05	0.06	0.13	0.02	0.03	0.09	–				
Subjective Knowledge	9	0.35	0.41	0.02	0.12	0.18	0.34	0.33	0.17	–			
Subjective norm	10	0.26	0.26	0.10	0.02	0.04	0.39	0.45	0.04	0.29	–		
Financial resources	11	0.09	0.09	0.02	0.02	0.09	0.03	0.08	0.17	0.15	0.07	–	
Sustainability beliefs	12	0.35	0.37	0.04	0.08	0.05	0.04	0.45	0.09	0.24	0.53	0.04	–
Time pressure	13	0.19	0.11	0.11	0.14	0.18	0.44	0.26	0.14	0.28	0.30	0.10	0.15

Table 6
Outer weights of the healthy behaviour construct.

Food category	Outer weight
Pasta or rice ->Behaviour	0.15**
Vegetables ->Behaviour	0.60***
Fruit->Behaviour	0.25***
Cheese ->Behaviour	−0.26***
Red meat ->Behaviour	0.34***
Fish ->Behaviour	0.24***
Legumes ->Behaviour	0.25***

Note: ***$p < 0.01$; **$p < 0.05$.

constructs. In our model, none of the Gaussian Copulas were statistically significant, confirming that endogeneity is not a concern.

4.2. Structural model results

The implementation of the structural model relied on the bootstrapping routine and the PLSpredict procedure (Hair et al., 2022), with 10,000 samples and confidence intervals constructed via the percentile method. Collinearity among the predictor constructs in the structural (inner) model was assessed through the Variance Inflation Factor (VIF), with all values falling below the recommended threshold of 5 (Table A3 in Appendix A).

Table 7 reports the results of the PLS-SEM model. We further assessed whether structural estimates depend on the specific penalty function used to construct the behavioural indicators by re-estimating the model under alternative monotonic penalty functions consistent with the non-compensatory assumption (Table A4, Appendix A). Across the baseline quadratic coding and the alternative linear/convex specifications, key paths remain stable in sign, statistical significance, and magnitude, and explained variance changes only marginally.

Starting from the classic TPB relationship, we find that the intention to improve the healthiness of one's diet is positively and significantly influenced by both attitude (H1) and subjective norm (H2), with attitude displaying the highest coefficient in the entire model. The multicomponent elements of PBC are significant, with the exception of eating self-control and financial resources (H4a and H5a). Specifically, higher cooking skills (H3a), greater subjective knowledge (H6a), and increasing time pressure (H7a) positively influence intention. Consequently, hypotheses H1, H2, H3a, and H6a are supported. By contrast, H4a and H5a are rejected due to a lack of statistical significance. H7a is also rejected as the observed relationship runs counter to the hypothesised direction. With regard to the extended part of the model, sustainability beliefs exert a positive effect on intention, thereby supporting H8. Moreover, sustainability beliefs display the second-highest coefficient after attitude, highlighting their salience among the motivational correlates of intention to eat healthily.

Turning to behaviour, intention exerts the expected positive and

Table 7
Structural path coefficients and hypothesis testing results for the baseline and extended models.

Hypothesis	Path	Baseline model	Extended model
H1 - Supported	Attitude ->Intention	0.25*** [0.20; 0.31]	0.25*** [0.20; 0.31]
H2 - Supported	Subjective norm - > Intention	0.17*** [0.12; 0.23]	0.17*** [0.12; 0.23]
H3a - Supported	Cooking skills - > Intention	0.10*** [0.04; 0.15]	0.10*** [0.04; 0.15]
H4a - Not supported	Eating self-control - > Intention	−0.04 [−0.09; 0.02]	−0.04 [−0.09; 0.02]
H5a - Not supported	Financial resources - > Intention	0.03 [−0.02; 0.07]	0.03 [−0.02; 0.07]
H6a - Supported	Subjective knowledge - > Intention	0.15*** [0.09; 0.20]	0.15*** [0.09; 0.20]
H7a - Not supported (opposite sign)	Time pressure - > Intention	0.11*** [0.06; 0.17]	0.11*** [0.06; 0.17]
H8 - Supported	Sustainability beliefs - > Intention	0.18*** [0.12; 0.23]	0.18*** [0.12; 0.23]
H9 - Supported	Intention - > Behaviour	0.11*** [0.05; 0.18]	0.12*** [0.06; 0.18]
H3b - Supported	Cooking skills - > Behaviour	0.16*** [0.11; 0.22]	0.22*** [0.15; 0.28]
H4b - Supported	Eating self-control - > Behaviour	0.06** [0.01; 0.12]	0.06* [0.01; 0.12]
H5b - Supported	Financial resources - > Behaviour	0.09*** [0.04; 0.15]	0.10*** [0.04; 0.15]
H6b - Supported	Subjective knowledge - > Behaviour	0.20*** [0.15; 0.26]	0.20*** [0.14; 0.25]
H7b - Supported	Time pressure - > Behaviour	−0.08** [−0.13; −0.02]	−0.09*** [−0.14; −0.03]
H10a - Supported	Gender - > Behaviour	0.21*** [0.10; 0.32]	0.20*** [0.09; 0.31]
H10b - Supported	Age - > Behaviour	0.13*** [0.05; 0.21]	0.12*** [0.05; 0.20]
H10c - Supported	Education - > Behaviour	0.07** [0.02; 0.13]	0.07** [0.02; 0.13]
H10d - Supported	Household size - > Behaviour	0.07** [0.02; 0.13]	0.07** [0.02; 0.13]
	Time pressure^2 - > Behaviour		−0.06** [−0.10; −0.02]
	Cooking skills^2 - > Behaviour		0.04* [0.01; 0.08]

Note: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$. For gender 1 = female; 0 = male. Hypothesis decisions are based on the baseline model. The 90% confidence intervals are reported in parentheses next to the beta coefficients.

significant effect on healthy eating behaviour, confirming H9. Although statistically significant, the magnitude of this effect is modest, consistent with the well-documented intention–behaviour gap in dietary behaviours. Interestingly, the analysis of the multicomponent PBC reveals both consistencies and divergences with the intention model. Cooking skills (H3b) and subjective knowledge (H6b) once again emerge as significant and positive determinants of behaviour, supporting both hypotheses. Time pressure is also significant; however, unlike its positive role in the intention model, it acts as a barrier to healthy behaviour, thus confirming H7b. In contrast, financial resources exhibit a positive effect on behaviour, indicating that greater perceived means facilitate healthy dietary choices, as hypothesised (H5b). Similarly, eating self-control, previously non-significant in the intention model, directly promotes the adoption of a healthy diet, supporting H4b.

Regarding the control variables, healthy behaviour improves with age, is higher among women, increases with education, and is more prevalent in larger households, confirming H10a-H10d collectively.

The results of the extended model are broadly consistent with those of the baseline model. Interestingly, the inclusion of two quadratic terms reveals that the negative effect of time pressure on behaviour is exponential. This suggests that time pressure is a key factor: while it acts as a linear driver of intention, it has an exponentially more detrimental impact on actual dietary behaviour. Conversely, cooking skills exert an exponentially positive effect on behaviour, amplifying the linear influence already observed for this construct. Regarding model fit, the baseline specification explains 36% of the variance in intention ($R^2 = 0.36$) and 23% in behaviour ($R^2 = 0.23$), while the extended model slightly increases the explanatory power for behaviour ($R^2 = 0.24$). These values are satisfactory in behavioural research contexts, where intention and behaviour are influenced by multiple psychological determinants. The Bayesian Information Criterion (BIC) remains comparable across specifications, indicating no substantial change in model parsimony.

In terms of predictive relevance, we assessed Q^2_predict values, following Hair et al. (2022). The Q^2_predict values confirm an adequate level of predictive relevance for intention (0.35) and a satisfactory level for behaviour (0.19), reinforcing the explanatory performance reported above.

5. Discussion

Overall, and in line with previous TPB-based research on healthy eating (Li et al., 2019; McDermott et al., 2015; Riebl et al., 2015), our results confirm the solid explanatory power of the TPB. Consistent with this latter (Ajzen, 1991) and with extensive empirical evidence in the healthy eating domain, our results confirmed that attitude and subjective norm are key drivers of the intention to eat healthily. In particular, attitude emerged as the strongest predictor in the intention model (H1 supported). This finding is fully consistent with meta-analytic evidence showing that attitude is typically the most powerful determinant of dietary intentions (McDermott et al., 2015; McEachan et al., 2016). Importantly, the magnitude of the attitude coefficient indicates that internalised orientations towards healthy eating remain central even when additional constructs, such as sustainability beliefs and a decomposed PBC, are introduced into the model. In practical terms, this suggests that policies and interventions cannot bypass attitude formation: regardless of the structural or contextual support provided, individuals still need to perceive healthy eating as personally valuable, meaningful, and coherent with their self-identity.

Similarly, subjective norm showed a positive and significant influence on intention (H2 supported), in line with previous findings showing that perceived social approval and expectations from significant others enhance individuals' willingness to engage in healthy dietary behaviours (Li et al., 2019). This result is particularly consistent with evidence suggesting that eating is a socially embedded practice, shaped not only by individual preferences but also by shared norms, routines, and expectations (Higgs & Thomas, 2016).

By disaggregating PBC into distinct subcomponents, this study responds to calls for a more fine-grained operationalisation of control in TPB-based models (Contini et al., 2020; Rhodes et al., 2006). Among the PBC components, cooking skills positively influenced intention (H3a supported), confirming previous evidence that perceived competence in food preparation enhances readiness and motivation to adopt healthier diets (Fantechi et al., 2024; Garcia et al., 2016; Hagmann et al., 2020). Individuals who feel capable of cooking are more likely to perceive healthy eating as feasible and manageable, rather than as a burdensome or unrealistic goal. Similarly, subjective knowledge about healthy eating is positively related to intention (H6a supported), in line with studies showing that nutrition knowledge and food literacy facilitate intention formation by reducing uncertainty and increasing perceived self-efficacy (Aureli & Rossi, 2022). Overall, these findings indicate that skills and knowledge already operate at the motivational stage, making healthy eating feel doable rather than just “desirable”.

In contrast, eating self-control and financial resources did not significantly influence intention (H4a and H5a not supported). This pattern is consistent with TPB-based evidence indicating that individuals may express strong intentions to eat healthily even when they recognise personal or structural barriers (Daniel, 2020; McEachan et al., 2016). In other words, intention formation appears to be relatively insensitive to constraints that become binding only at the implementation stage. This interpretation aligns with broader behavioural research suggesting that intentions can reflect aspirational goals rather than realistic assessments of one's capacity to act (Sheeran, 2002).

The case of time pressure further illustrates this dynamic. Contrary to expectations, time pressure showed a positive association with intention (H7a not supported in sign). While previous studies consistently report that time scarcity undermines diet quality and encourages reliance on convenience foods (Alm & Olsen, 2017; Venn & Strazdins, 2017), our findings suggest that time-pressured individuals may nonetheless express stronger intentions to improve their diet. It should be noted, however, that no theoretical rationale was specified in advance for this pattern, and what follows should therefore be read as exploratory and warrants further investigation. Nevertheless, one tentative plausible reading is that, for people who feel constantly rushed, stating an intention to eat better is also a way of “correcting the course”: the intention goes up, even if daily routines still make follow-through difficult (Fantechi et al., 2024). From a policy perspective, this result is particularly important, as it signals that high intention among time-poor groups does not necessarily imply ease of behavioural change.

A key contribution of this study lies in the explicit inclusion of healthy diet sustainability beliefs within an extended TPB framework for healthy eating. Sustainability beliefs showed a strong positive association with intention (H8 supported), emerging as the second strongest relationship after attitude. This finding confirms and extends recent research suggesting that health and sustainability motives are psychologically interconnected, and that concern for environmental outcomes can reinforce individuals' motivation to adopt healthier dietary patterns (Baur et al., 2022; Chen et al., 2024; Slotnick et al., 2024). Importantly, this result extends the findings of previous TPB-based studies on healthy eating, which have largely focused on health-related motives alone (Brouwer & Mosack, 2015; Canova et al., 2020), by demonstrating that sustainability-related values contribute independently to intention formation.

Turning to actual behaviour, intention had the expected positive and significant effect (H9 supported), consistent with TPB theory and with meta-analytic evidence in nutrition research (Ashrafi et al., 2023; McDermott et al., 2015). However, the modest magnitude confirms that intention alone is insufficient to fully explain dietary behaviour, echoing the widely documented intention-behaviour gap in health-related behaviours (Biasini et al., 2021; McEachan et al., 2016). This result provides empirical justification for extending the TPB with additional constructs and sociodemographic characteristics.

The multicomponent PBC analysis reveals that different components become salient at the behavioural stage. Cooking skills and subjective knowledge remained significant positive predictors of behaviour (H3b and H6b supported), consistent with evidence that practical competence and food literacy directly support healthier food choices in everyday contexts (Mengi Çelik et al., 2023). Notably, the effect of cooking skills appears to strengthen as skill levels increase, reinforcing the role of skills- and knowledge-based interventions as effective levers for improving diet quality, not only by motivating individuals but also by enabling them to act.

By contrast, eating self-control and financial resources, which were non-significant for intention, emerged as significant drivers of behaviour (H4b and H5b supported). This asymmetry is theoretically coherent and aligns with research emphasising the role of self-regulatory capacity and economic constraints in determining whether intentions are successfully enacted (Stroebe, 2022; van der Velde et al., 2022). Recent meta-analytic evidence further confirms that trait self-control is meaningfully associated with health-related behaviours, including healthy eating outcomes, even when intentions are controlled for (Andrade et al., 2023).

The role of time pressure further illustrates this divergence. While time pressure increased intention, it acted as a clear barrier to behaviour (H7b supported), and the observed non-linear effect suggests that beyond a certain threshold, the negative impact of time constraints increases exponentially, resulting in an increasingly detrimental effect on dietary behaviour. This is coherent with evidence showing that time scarcity disproportionately affects actual food practices, such as shopping, cooking, and meal structure, rather than motivational goals (Alm & Olsen, 2017).

From a food systems perspective, these findings suggest that promoting healthy and sustainable diets requires more than value-based communication. Sustainability-oriented messages may effectively increase motivation and intention, but their behavioural impact depends on the availability of practical enablers embedded in the food environment, such as time-saving healthy options, accessible ingredients, and support for cooking skills. In this respect, future research and policy interventions could also benefit from considering the role of attribute framing in shaping consumers' attitudes and intentions towards food choices. Evidence suggests that the way food attributes are framed (e.g., highlighting health versus environmental benefits) can significantly influence consumers' evaluations and behavioural intentions (Dolgopolova et al., 2022). Integrating attribute framing strategies may therefore enhance the effectiveness of communication aimed at promoting both healthy and sustainable diets. This mechanism may be particularly relevant when health and sustainability attributes are jointly communicated.

The effects of sociodemographic controls provide additional insights for intervention design. Healthier dietary behaviour was observed among women, older individuals, those with higher education, and those living in larger households, confirming H10a–H10d. These results replicate well-established patterns in nutrition research (Alkerwi et al., 2015; Ares et al., 2025; Fenton et al., 2024). From a practical perspective, these findings suggest the need for targeted and differentiated interventions. Men and younger adults appear to be at higher risk of suboptimal diets and may require tailored communication strategies, potentially leveraging different messengers, social media channels, or peer-based norms. Lower-education groups may benefit particularly from programmes that combine nutrition education with practical skills, such as shopping for healthy food on a budget or interpreting food labels. Household size deserves special attention. The healthier diets observed in larger households may be partly explained by the presence of children or other dependents, which often requires greater meal planning and more structured food routines. In this sense, larger households may benefit from organisational constraints that unintentionally support healthier eating practices. Conversely, individuals living alone or in small households may face specific challenges, including convenience-oriented eating and lower motivation to cook.

6. Conclusions and limitations

6.1. Limitations

Despite its contributions, the study is subject to some methodological limitations. First, the decomposition of PBC into multiple subcomponents represents a deviation from the original specification of the TPB proposed by Ajzen (1991), in which PBC is typically modelled as a single construct. While this approach was adopted to capture more nuanced facets of perceived control that may be particularly relevant in the context of dietary behaviour, it introduces a modelling choice that differs from the classical TPB operationalisation. Accordingly, the results should be interpreted with this consideration in mind. More broadly, the operationalisation of control-related beliefs and their aggregation into PBC subcomponents may not fully reflect the original belief structure of the TPB, where behavioural, normative, and control beliefs are expected to align closely with their corresponding constructs.

In addition, the operationalisation of healthy eating behaviour was necessarily selective, focusing on key food categories while omitting others that may also contribute to overall diet quality. Relatedly, our behavioural measures relied on absolute consumption frequencies of individual food categories rather than on meal-level composition. This approach does not allow us to account for how foods are combined within meals, which may be nutritionally meaningful. While this approach ensures consistency with nutritional recommendations, it does not capture full dietary composition, meal-level structure, or explicit trade-offs between food categories.

Another constraint relates to the cross-sectional design of the study, which does not allow for the observation of prospective behaviour and limits causal interpretation of the relationships between intentions and actual dietary outcomes.

An additional consideration concerns the fact that the recent Theory of Reasoned Goal Pursuit (TRGP) was not explicitly incorporated into the empirical model. Future research could further explore how goal activation and belief–goal alignment influence healthy and sustainable eating behaviour within this extended theoretical perspective.

A key methodological issue concerns the operationalisation of dietary behaviour. The behavioural index was constructed using a non-linear penalty scheme (0, −1, −4, −9) designed to reflect the non-compensatory nature of dietary risk by assigning disproportionately higher penalties to larger deviations from recommended intakes. While this approach is conceptually grounded and robustness checks using alternative specifications confirm that the main structural relationships remain stable, the specific penalty values themselves lack direct empirical validation. As a result, part of the explained variance in behaviour ($R^2 = 0.23$) may reflect the chosen weighting structure rather than purely the model's predictive power. Future research should therefore validate this approach against objective dietary measures, such as 24-h dietary recalls or nutritional biomarkers, in order to strengthen the construct validity of the behavioural index.

A related issue arises from the partial misalignment between intention and behaviour measures in relation to the TACT principle. In the present study, intention was captured as a general orientation towards healthy eating, whereas behaviour was measured through specific food consumption frequencies. This mismatch in target, action, context, and time may contribute to the relatively modest intention–behaviour coefficient observed in the model and may partly reflect a measurement artefact rather than purely behavioural inertia. Future studies should adopt fully compatible measures, ensuring alignment between intention and behaviour at the same level of specificity.

Finally, an important caveat concerns the untested assumption regarding the indirect role of sustainability beliefs. The model was specified under the theoretical assumption that sustainability beliefs influence behaviour primarily through intention; however, the direct path from sustainability beliefs to behaviour was not empirically estimated. While this assumption is consistent with TPB theory and the value–action gap literature, future research should explicitly test both direct and indirect pathways in order to provide a more robust assessment of the mechanisms linking sustainability-related motivations to actual dietary behaviour.

6.2. Conclusions and implications

Our study makes several contributions. On the theoretical side, the results support a more granular reading of control within the TPB. By unpacking PBC into distinct sub-dimensions, we revealed which aspects of perceived capability actually drive intentions versus behaviour. The findings challenge the commonly adopted approach to PBC in traditional models: time pressure, eating self-control, and financial resources operate differently at intentional and behavioural stages. Second, the introduction of healthy diet sustainability beliefs extends traditional health-focused models in meaningful ways. The positive and significant association between sustainability beliefs and the intention to eat healthily indicates that dietary goals are not formed solely based on personal health considerations. Rather, they are additionally grounded in value-based considerations regarding environmental impact and sustainability, indicating that healthy eating intentions can be embedded within a broader pro-environmental mindset. Third, our results involving quadratic effects for time pressure and cooking skills provide the insight that theory might incorporate when predicting outcomes in extreme conditions.

On the practical side, our findings offer guidance for designing interventions and policies to promote healthy eating. One clear implication is the value of investing in capacity-building for healthy eating: improving cooking skills and healthy eating subjective knowledge in the population likely increases both the intention and execution of healthy diets. Governments and community organisations could, for example, provide free or subsidised cooking workshops, healthy recipe resources, or nutrition courses. Such programs should particularly target younger adults or those with lower education, who scored lower on those constructs.

The significance of financial resources in determining behaviour implies that economic measures can play a role in closing the healthy eating intention-behaviour gap. Policymakers might consider subsidies or incentives to reduce the cost of healthy foods. Our findings would predict that such measures could directly improve dietary behaviour for those who intend to eat healthily but currently perceive financial constraints. In parallel, misinformation about cost should be addressed; communication strategies can highlight affordable healthy options to counter the perception that healthy eating is always expensive.

Importantly, our study sheds light on how sustainability beliefs could be harnessed to foster healthy food choices. The strong influence of sustainability concern on intention suggests that framing healthy eating in terms of environmental benefits can be an effective way to motivate people. Public campaigns and media communications could tap into citizens' increasing environmental awareness, in line with the One Health approach that emphasises the interconnectedness of human, environmental and ecosystem health, by linking everyday food choices to climate and ecological outcomes. For example, educational initiatives should place greater emphasis on the convergence between personal health and planetary health, reinforcing the coherence of these goals. However, these motivational communicative efforts must be paired with practical support and structural changes to facilitate action.

Declaration of generative AI use

During the preparation of this work the authors used ChatGPT in order to improve English language and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

CRediT authorship contribution statement

Elena Radicioni: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Leonardo Casini:** Writing – review & editing, Validation, Resources, Methodology, Funding acquisition, Conceptualization. **Tommaso Fantechi:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Funding

Funding for this study was provided by the PRIN 2022 programme, project ChoiceHealthFood (2023–2025) – (Un)healthy food and choice behaviour, funded by the Italian Ministry of University and Research (MUR) under the PRIN funding scheme.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1
Criteria for assigning dietary healthiness scores. The number of consumers falling into each category is reported in parentheses.

	Score			
Food category	0	−1	−4	−9
Pasta or rice	once a day (611)	less than once a day (339)	twice a day (35)	three or more times a day (15)
Vegetables	three or more times a day (48)	twice a day (313)	once a day (415)	less than once a day (224)
Fruit	three or more times a day (112)	twice a day (367)	once a day (347)	less than once a day (174)
Cheese	less than once a week (244)	1–3 times a week (556)	4–6 times a week (168)	seven or more times a week (32)
Red meat	less than once a week (414)	1–3 times a week (510)	4–6 times a week (68)	seven or more times a week (8)
White meat	1–3 times a week (602)	less than once a week (302)	4–6 times a week (85)	seven or more times a week (11)
Sweets	less than once a week (328)	1–3 times a week (385)	4–6 times a week (196)	seven or more times a week (91)
Fish	four times a week or more (263)	1–3 times a week (370)	less than once a week (248)	never or rarely (119)
Legumes	four times a week or more (123)	1–3 times a week (252)	less than once a week (320)	never or rarely (305)

Table A2
Fornell–Larcker criterion for the assessment of discriminant validity.

Construct	Code	1	2	3	4	5	6	7	8	9	10	11	12	13
Attitude	1	**0.83**												
Subjective norm	2	0.22	**0.80**											
Cooking skills	3	0.34	0.21	**0.85**										
Eating self-control	4	−0.09	0.28	0.01	**0.84**									
Financial resources	5	−0.08	−0.06	−0.08	0.03	**1.00**								
Subjective knowledge	6	0.35	0.10	0.35	−0.20	−0.14	**0.79**							
Time pressure	7	0.17	0.23	0.10	0.35	0.09	−0.08	**0.85**						
Sustainability beliefs	8	0.33	0.44	0.31	0.03	−0.04	0.23	0.13	**0.90**					
Intention	9	0.45	0.38	0.34	0.08	−0.08	0.31	0.23	0.41	**0.92**				
Gender	10	0.08	0.00	0.25	0.03	0.09	0.16	0.16	0.05	0.15	**1.00**			
Age	11	−0.01	0.02	0.14	−0.17	0.02	0.08	−0.12	0.08	−0.02	−0.01	**1.00**		
Education	12	0.08	0.02	0.04	−0.17	0.03	0.15	0.12	0.08	0.08	0.02	−0.13	**1.00**	
Household size	13	0.04	0.09	0.04	0.07	−0.02	0.02	0.10	0.04	0.06	0.04	−0.16	0.06	**1.00**

Note: Inter-construct correlations are reported below the diagonal. The diagonal elements (in bold) report the square root of the Average Variance Extracted (AVE) for each construct. Discriminant validity is supported when each diagonal value exceeds the corresponding inter-construct correlations.

Table A3
Variance inflation factor (VIF) among predictors.

Path	Baseline model	Extended model
Attitude - > Intention	1.34	1.34
Subjective norm - > Intention	1.41	1.41
Cooking skills - > Intention	1.28	1.28
Eating self-control - > Intention	1.29	1.29
Financial resources - > Intention	1.03	1.03
Subjective knowledge - > Intention	1.31	1.31
Time pressure - > Intention	1.23	1.23
Sustainability beliefs - > Intention	1.40	1.40
Intention - > Behaviour	1.27	1.28
Cooking skills - > Behaviour	1.31	2.04
Eating self-control - > Behaviour	1.20	1.21
Financial resources - > Behaviour	1.08	1.08
Subjective knowledge - > Behaviour	1.33	1.34
Time pressure - > Behaviour	1.27	1.30
Gender - > Behaviour	1.12	1.12
Age - > Behaviour	1.10	1.15
Education - > Behaviour	1.09	1.09
Household size - > Behaviour	1.04	1.05
Time pressure^2 - > Behaviour		1.10
Cooking skills^2 - > Behaviour		1.67

Table A4
Sensitivity analysis of the structural model under alternative monotonic penalty functions used to operationalise dietary behaviour. The baseline quadratic specification (x^2) is compared with cubic (x^3), power 1.5 ($x^{1.5}$) and linear (x^1) transformations. All models were estimated using the same PLS-SEM procedure and bootstrapping routine as in the main analysis.

Path	Cubic x^3	Quadratic (x^2)	Power ($x^{1.5}$)	Linear (x^1)
Attitude - > Intention	0.25***	0.25***	0.25***	0.25***
Subjective norm - > Intention	0.17***	0.17***	0.17***	0.17***
Cooking skills - > Intention	0.10***	0.10***	0.10***	0.10***
Eating self-control - > Intention	−0.04	−0.04	−0.04	−0.04
Financial resources - > Intention	0.02	0.03	0.03	0.03
Subjective knowledge - > Intention	0.15***	0.15***	0.15***	0.15***
Time pressure - > Intention	0.11***	0.11***	0.11***	0.11***
Sustainability beliefs - > Intention	0.18***	0.18***	0.18***	0.18***
Intention - > Behaviour	0.10***	0.11***	0.13***	0.13***
Cooking skills - > Behaviour	0.17***	0.16***	0.17***	0.17***
Eating self-control - > Behaviour	0.05*	0.06**	0.07**	0.08**
Financial resources - > Behaviour	0.09***	0.09***	0.09***	0.09***
Subjective knowledge - > Behaviour	0.20***	0.20***	0.20***	0.20***
Time pressure - > Behaviour	−0.08**	−0.08**	−0.07**	−0.07**
Gender - > Behaviour	0.16**	0.21***	0.23***	0.26***
Age - > Behaviour	0.12**	0.13***	0.12***	0.09**
Education - > Behaviour	0.08**	0.07**	0.07**	0.06*
Household size - > Behaviour	0.09***	0.07**	0.06*	0.04
R2				
Intention	0.36	0.36	0.36	0.36
Behaviour	0.21	0.23	0.24	0.24

Note: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

Data availability

Data will be made available on request.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In Action control: From cognition to behavior (pp. 11–39). Berlin, Heidelberg: Springer Berlin Heidelberg.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Ajzen, I. (2015). Consumer attitudes and behavior: The theory of planned behavior applied to food consumption decisions. *Italian Review of Agricultural Economics (REA), 70*(2), 121–138.

Ajzen, I., & Sheikh, S. (2013). Action versus inaction: Anticipated affect in the theory of planned behavior. *Journal of Applied Social Psychology, 43*(1), 155–162.

Alkerwi, A. A., Vernier, C., Sauvageot, N., Crichton, G. E., & Elias, M. F. (2015). Demographic and socioeconomic disparity in nutrition: Application of a novel correlated component regression approach. *BMJ Open, 5*(5), Article e006814.

Allen, M. S., Mishra, M., Tashjian, S. M., & Laborde, S. (2024). Linking Big Five personality traits to components of diet: A meta-analytic review. *Journal of Personality and Social Psychology, 128*(4), 905–929.

Alm, S., & Olsen, S. O. (2017). Coping with time pressure and stress: Consequences for families' food consumption. *Journal of Consumer Policy, 40*(1), 105–123.

Andrade, F. C., & Hoyle, R. H. (2023). A synthesis and meta-analysis of the relationship between trait self-control and healthier practices in physical activity, eating, and sleep domains. *Personality and Individual Differences, 205*, Article 112095.

Ares, G., Brunet, G., Giménez, A., Girona, A., & Vidal, L. (2025). Understanding fruit and vegetable consumption among Uruguayan adults. *Appetite, 206*, Article 107824.

Arrazat, L., Nicklaus, S., de Lauzon-Guillain, B., & Marty, L. (2024). Behavioural determinants of healthy and environmentally friendly diets in French university students. *Appetite, 200*, Article 107532.

Ashrafi, E., Mansourian, M., Azar, F. E. F., Rahideh, S. T., Ezadi, B., & Osmani, F. (2023). Investigation of factors related to healthy eating behavior based on the developed theory of planned behavior in adolescents. *Journal of Education and Health Promotion, 12*(1), 274.

Aureli, V., & Rossi, L. (2022). Nutrition knowledge as a driver of adherence to the Mediterranean diet in Italy. *Frontiers in Nutrition, 9*, Article 804865.

Baur, I., Stylianou, K. S., Ernstoff, A., Hansmann, R., Jolliet, O., & Binder, C. R. (2022). Drivers and barriers toward healthy and environmentally sustainable eating in Switzerland: Linking impacts to intentions and practices. *Frontiers in Sustainable Food Systems, 6*, Article 808521.

Berli, C., Loretini, P., Radtke, T., Hornung, R., & Scholz, U. (2014). Predicting physical activity in adolescents: The role of compensatory health beliefs within the health action process approach. *Psychology & Health, 29*(4), 458–474.

Biasini, B., Rosi, A., Giopp, F., Turgut, R., Scazzina, F., & Menozzi, D. (2021). Understanding, promoting and predicting sustainable diets: A systematic review. *Trends in Food Science & Technology, 111*, 191–207.

Biasini, B., Rosi, A., Scazzina, F., & Menozzi, D. (2023). Predicting the adoption of a sustainable diet in adults: A cross-sectional study in Italy. *Nutrients, 15*(12), 2784.

Boncompagni, A., Cristini, G., & Zerbini, C. (2025). From sustainability to health: Investigating the halo effect in food consumption behavior. *Sustainable Production and Consumption, 60*, 111–122.

Brouwer, A. M., & Mosack, K. E. (2015). Expanding the theory of planned behavior to predict healthy eating behaviors: Exploring a healthy eater identity. *Nutrition & Food Science, 45*(1), 39–53.

Brunner, T. A., Van der Horst, K., & Siegrist, M. (2010). Convenience food products. Drivers for consumption. *Appetite, 55*(3), 498–506.

Buckley, M., Cowan, C., & McCarthy, M. (2007). The convenience food market in Great Britain: Convenience food lifestyle (CFL) segments. *Appetite, 49*(3), 600–617.

Burke, M. V., & Small, D. M. (2016). Effects of the modern food environment on striatal function, cognition and regulation of ingestive behavior. *Current Opinion in Behavioral Sciences, 9*, 97–105.

Canova, L., Bobbio, A., & Manganelli, A. M. (2020). Predicting fruit consumption: A multi-group application of the theory of planned behavior. *Appetite, 145*, Article 104490.

Chen, X., Jiang, X., & Wu, L. (2024). Drivers of consumers' intention to adopt sustainable healthy dietary patterns: Evidence from China. *Frontiers in Sustainable Food Systems, 7*, 1269242.

Conner, M., Norman, P., & Bell, R. (2002). The theory of planned behavior and healthy eating. *Health Psychology, 21*(2), 194.

Contini, C., Boncinelli, F., Gerini, F., Scozzafava, G., & Casini, L. (2018). Investigating the role of personal and context-related factors in convenience foods consumption. *Appetite, 126*, 26–35.

Contini, C., Boncinelli, F., Marone, E., Scozzafava, G., & Casini, L. (2020). Drivers of plant-based convenience foods consumption: Results of a multicomponent extension of the theory of planned behaviour. *Food Quality and Preference, 84*, Article 103931.

da Costa, G. G., da Conceição Nepomuceno, G., da Silva Pereira, A., & Simões, B. F. T. (2022). Worldwide dietary patterns and their association with socioeconomic data: An ecological exploratory study. *Globalization and Health, 18*(1), 31.

CREA (2019). Linee guida per una sana alimentazione. Revisione 2018. URL https://sapermangiare.mobi/files/download/linee-guida/linee-guida-completo.pdf (accessed 16.12.25).

Dallacker, M., Hertwig, R., & Mata, J. (2019). Quality matters: A meta-analysis on components of healthy family meals. *Health Psychology, 38*(12), 1137.

Daniel, C. (2020). Is healthy eating too expensive?: How low-income parents evaluate the cost of food. *Social Science & Medicine, 248*, Article 112823.

Dolgopolova, I., Li, B., Pirhonen, H., & Roosen, J. (2022). The effect of attribute framing on consumers' attitudes and intentions toward food: A Meta-analysis. *Bio-Based and Applied Economics, 10*(4), 253–264.

ElHaffar, G., Durif, F., & Dubé, L. (2020). Towards closing the attitude-intention-behavior gap in green consumption: A narrative review of the literature and an overview of future research directions. *Journal of Cleaner Production, 275*, Article 122556.

Esposito, C. M., Ceresa, A., & Buoli, M. (2021). The association between personality traits and dietary choices: A systematic review. *Advances in Nutrition, 12*(4), 1149–1159.

Essiz, O., Yurteri, S., Mandrik, C., & Senyuz, A. (2023). Exploring the value-action gap in green consumption: Roles of risk aversion, subjective knowledge, and gender differences. *Journal of Global Marketing, 36*(1), 67–92.

Fantechi, T., Contini, C., & Casini, L. (2024). The meaty gender gap: Understanding gender-based differences in intention to reduce red meat consumption. *Food Quality and Preference, 113*, Article 105078.

FAO, & WHO. (2019). *Sustainable healthy diets: Guiding principles*. FAO.

FAO, WHO, UNEP, & WOAH. (2022). *One health joint plan of action (2022–2026)*. Food and Agriculture Organization of the United Nations.

Fardet, A., & Rock, E. (2014). Toward a new philosophy of preventive nutrition: From a reductionist to a holistic paradigm to improve nutritional recommendations. *Advances in Nutrition, 5*(4), 430–446.

Fenton, S., Ashton, L. M., Lee, D. C., & Collins, C. E. (2024). Gender differences in diet quality and the association between diet quality and BMI: An analysis in young Australian adults who completed the healthy eating quiz. *Journal of Human Nutrition and Dietetics, 37*(4), 943–951.

Ferreira, A. F., Abreu, S., & Martins, M. L. (2024). Determinants of adherence to sustainable healthy diets among Portuguese adults. *NFS Journal, 37*, Article 100200.

Fila, S. A., & Smith, C. (2006). Applying the theory of planned behavior to healthy eating behaviors in urban native American youth. *International Journal of Behavioral Nutrition and Physical Activity, 3*(1), 11.

Fiolet, T., Srour, B., Sellem, L., Kesse-Guyot, E., Allès, B., Méjean, C., et al. (2018). Consumption of ultra-processed foods and cancer risk: Results from the NutriNet-Santé prospective cohort. *British Medicine Journal, 360*, Article k322.

Flynn, L. R., & Goldsmith, R. E. (1999). A short, reliable measure of subjective knowledge. *Journal of Business Research, 46*(1), 57–66.

Garcia, A. L., Reardon, R., McDonald, M., & Vargas-Garcia, E. J. (2016). Community interventions to improve cooking skills and their effects on confidence and eating behaviour. *Current Nutrition Reports, 5*(4), 315–322.

Gerini, F., Contini, C., Marinelli, N., & Casini, L. (2025). Unpacking the motivations behind direct purchases from the farmer: The role of personal versus public outcomes in Italy. *Journal of Cleaner Production, 510*, Article 145625.

Grunert, K. G., Wills, J., Celemín, L. F., Lähteenmäki, L., Scholderer, J., & genannt Bonsmann, S. S. (2012). Socio-demographic and attitudinal determinants of nutrition knowledge of food shoppers in six European countries. *Food Quality and Preference, 26*(2), 166–177.

Hagger, M. S., Cheung, M. W. L., Ajzen, I., & Hamilton, K. (2022). Perceived behavioral control moderating effects in the theory of planned behavior: A meta-analysis. *Health Psychology, 41*(2), 155.

Hagmann, D., Siegrist, M., & Hartmann, C. (2020). Acquisition of cooking skills and associations with healthy eating in Swiss adults. *Journal of Nutrition Education and Behavior, 52*(5), 483–491.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Evaluation of formative measurement models. In *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook* (pp. 91–113). Cham: Springer International Publishing.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 139–152.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2018). *Advanced issues in partial least squares structural equation modeling*. Thousand Oaks, CA: SAGE Publications.

Hair, J. F., Thomas, G., Hult, M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Thousand Oaks, CA: SAGE Publications.

Hamilton, K., Phipps, D. J., Schmidt, P., Bamberg, S., & Ajzen, I. (2024). First test of the theory of reasoned goal pursuit: Predicting physical activity. *Psychology & Health, 39*(1), 24–41.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*, 115–135.

Higgs, S., & Thomas, J. (2016). Social influences on eating. *Current Opinion in Behavioral Sciences, 9*, 1–6.

Hung, Y., Grunert, K. G., Hoefkens, C., Hieke, S., & Verbeke, W. (2017). Motivation outweighs ability in explaining European consumers' use of health claims. *Food Quality and Preference, 58*, 34–44.

ISTAT (2025). Demografia in cifre: Popolazione residente per sesso, età e stato civile al 1° gennaio 2024. URL https://demo.istat.it/app/?i=POS&l=it (accessed 19.11.25).

Jordan, P. J., & Troth, A. C. (2020). Common method bias in applied settings: The dilemma of researching in organizations. *Australian Journal of Management, 45*(1), 3–14.

Kareklas, I., Carlson, J. R., & 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. *Journal of Advertising, 43*(1), 18–32.

Keller, C., & Siegrist, M. (2015). Does personality influence eating styles and food choices? Direct and indirect effects. *Appetite, 84*, 128–138.
Knäuper, B., Rabiau, M., Cohen, O., & Patriciu, N. (2004). Compensatory health beliefs: Scale development and psychometric properties. *Psychology & Health, 19*(5), 607–624.
Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration, 11*(4), 1–10.
La Barbera, F., & Ajzen, I. (2020). Control interactions in the theory of planned behavior: Rethinking the role of subjective norm. *Europe's Journal of Psychology, 16*(3), 401.
Li, A. S. W., Figg, G., & Schuez, B. (2019). Socioeconomic status and the prediction of health promoting dietary behaviours: A systematic review and meta-analysis based on the theory of planned behaviour. *Applied Psychology: Health and Well-Being, 11*(3), 382–406.
Liu, D., Lee, S., & Hwang, J. Y. (2021). Factors related to the intention of healthy eating behaviors based on the theory of planned behavior: Focused on adults residing in Beijing, China. *Journal of Nutrition and Health, 54*(1), 67–75.
Mann, T., & Ward, A. (2025). The self-control of eating. *Annual Review of Psychology, 76*.
McDermott, M. S., Oliver, M., Svenson, A., Simnadis, T., Beck, E. J., Coltman, T., & Sharma, R. (2015). The theory of planned behaviour and discrete food choices: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 12*(1), 162.
McEachan, R., Taylor, N., Harrison, R., Lawton, R., Gardner, P., & Conner, M. (2016). Meta-analysis of the reasoned action approach (RAA) to understanding health behaviors. *Annals of Behavioral Medicine, 50*(4), 592–612.
de Menezes, M. C., Roux, A. V. D., de Lima Costa, B. V., & Lopes, A. C. S. (2018). Individual and food environmental factors: Association with diet. *Public Health Nutrition, 21*(15), 2782–2792.
Mengi Çelik, Ö., Aytekin Şahin, G., & Gürel, S. (2023). Do cooking and food preparation skills affect healthy eating in college students? *Food Science & Nutrition, 11*(10), 5898–5907.
Mozaffarian, D., Hao, T., Rimm, E. B., Willett, W. C., & Hu, F. B. (2011). Changes in diet and lifestyle and long-term weight gain in women and men. *New England Journal of Medicine, 364*(25), 2392–2404.
Nauta, R., & Derckx, L. (2007). Why sin?—A test and an exploration of the social and psychological context of resentment and desire. *Pastoral Psychology, 56*, 177–188.
Nunnally, J. C. (1978). *Psychometric theory* (2d ed.). McGraw-Hill.
Nystrand, B. T., & Olsen, S. O. (2020). Consumers' attitudes and intentions toward consuming functional foods in Norway. *Food Quality and Preference, 80*, Article 103827.
Pagliai, G., Dinu, M., Madarena, M. P., Bonaccio, M., Iacoviello, L., & Sofi, F. (2021). Consumption of ultra-processed foods and health status: A systematic review and meta-analysis. *British Journal of Nutrition, 125*(3), 308–318.
Park, S., & Gupta, S. (2012). Handling endogenous regressors by joint estimation using copulas. *Marketing Science, 31*(4), 567–586.
Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology, 63*, 539–569.
Reinhardt, T., Ambrogio, Y., Springer, L., & Tafel, M. (2024). Wine law, sustainable innovation and the emergence of a wine constitution. *Wine Economics and Policy, 13*(2), 15–23.
Rhodes, R. E., Blanchard, C. M., & Matheson, D. H. (2006). A multicomponent model of the theory of planned behaviour. *British Journal of Health Psychology, 11*(1), 119–137.
Riebl, S. K., Estabrooks, P. A., Dunsmore, J. C., Savla, J., Frisard, M. I., Dietrich, A. M., & Davy, B. M. (2015). A systematic literature review and meta-analysis: The theory of planned behavior's application to understand and predict nutrition-related behaviors in youth. *Eating Behaviors, 18*, 160–178.
Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3. SmartPLS GmbH, Boenningstedt. *Journal of Service Science and Management, 10*(3), 32–49.
Roininen, K., Lähteenmäki, L., & Tuorila, H. (1999). Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite, 33*(1), 71–88.
Roseman, M. G., Joung, H. W., Choi, E. K. C., & Kim, H. S. (2017). The effects of restaurant nutrition menu labelling on college students' healthy eating behaviours. *Public Health Nutrition, 20*(5), 797–804.
Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied, 80*(1), 1.
Sahibzada, U. F., Janjua, N. A., Afshari, L., & Shakil, M. (2025). Leading the transition toward sustainability through digital capabilities and digital innovation: The role of employee characteristics. *Journal of Innovation & Knowledge, 10*(3), Article 100723.
Sarstedt, M., Ringle, C. M., Cheah, J. H., Ting, H., Moisescu, O. I., & Radomir, L. (2020). Structural model robustness checks in PLS-SEM. *Tourism Economics, 26*(4), 531–554.
Scalvedi, M. L., Gennaro, L., Saba, A., & Rossi, L. (2021). Relationship between nutrition knowledge and dietary intake: An assessment among a sample of Italian adults. *Frontiers in Nutrition, 8*, Article 714493.
Sheeran, P. (2002). Intention-behavior relations: A conceptual and empirical review. *European Review of Social Psychology, 12*(1), 1–36.
Slotnick, M. J., Falbe, J., Wolfson, J. A., Jones, A. D., & Leung, C. W. (2024). Environmental-, climate-, and health-related dietary motivations are associated with higher diet quality in a national sample of US adults with lower incomes. *Journal of the Academy of Nutrition and Dietetics, 124*(5), 594–606.
de Souza, M. R., de Souza Andrade, A. C., Froelich, M., Muraro, A. P., & Rodrigues, P. R. M. (2023). Association of household composition with dietary patterns among adolescents in Brazil. *British Journal of Nutrition, 130*(7), 1213–1219.
Stroebe, W. (2022). The goal conflict model: A theory of the hedonic regulation of eating behavior. *Current Opinion in Behavioral Sciences, 48*, Article 101203.
van der Velde, L. A., van Dijk, W. W., Numans, M. E., & Kiefte-de Jong, J. C. (2022). Extending the theory of planned behavior for explaining dietary quality: The role of financial scarcity and food insecurity status. *Journal of Nutrition Education and Behavior, 54*(7), 636–646.
Venn, D., & Strazdins, L. (2017). Your money or your time? How both types of scarcity matter to physical activity and healthy eating. *Social Science & Medicine, 172*, 98–106.
Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength 1. *Journal of Applied Social Psychology, 33*(6), 1313–1330.
Xin, L., & Seo, S. (2020). The role of consumer ethnocentrism, country image, and subjective knowledge in predicting intention to purchase imported functional foods. *British Food Journal, 122*(2), 448–464.
Zhang, T., Grunert, K. G., & Guo, Y. (2026). Consumer minimalism in local food consumption: The impact of pro-environmental self-identity and locavorism. *Food Quality and Preference, 135*, Article 105711.
Zorbas, C., Palermo, C., Chung, A., Iguacel, I., Peeters, A., Bennett, R., & Backholer, K. (2018). Factors perceived to influence healthy eating: A systematic review and meta-ethnographic synthesis of the literature. *Nutrition Reviews, 76*(12), 861–874.