Food Quality and Preference 133 (2025) 105610

Contents lists available at ScienceDirect

Food Quality and Preference

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

Towards a healthy and sustainable diet: exploring factors influencing red meat consumption among excessive consumers in Western countries

Gerarda Caso [a], Laura Trinchera [b], Rosaria Romano [c,*], Riccardo Vecchio [a]

[a] University of Naples Federico II, Department of Agricultural Sciences, Italy.
[b] NEOMA Business School, Department of Information Systems, Supply Chain Management & Decision Support, France.
[c] University of Naples Federico II, Department of Economics and Statistics, Italy.

ARTICLE INFO

Keywords:
Consumer behavior
Processed meat
Theory of planned behavior
Intentions
Structural equation model

ABSTRACT

Excessive red and processed meat consumption poses health risks and contributes to environmental degradation. This study investigates factors driving reductions in such consumption, especially among excessive consumers, defined as individuals who exceed the meat consumption recommendations set by the World Health Organization (WHO) and who report to consume red and processed meat more than four times per week over a four-week period. To this end, we extend the Theory of Planned Behavior (TPB). We introduce personal norms as a mediator between social norms, perceived behavioral control, and attitudes toward reducing meat consumption. Additionally, by incorporating the Food Choice Motives scale, we identify drivers that may effectively motivate excessive consumers to reduce consumption. Survey data from Italy (n = 524) and France (n = 513) reveal that intentions to reduce meat consumption strongly align with behavior change. Key predictors include personal norms, social influences, perceived control, and motives related to health, sustainability, and convenience. These associations remain consistent across both countries, suggesting similar factors influence meat reduction among Western consumers. Our findings underscore the potential to improve public health and promote sustainable food practices by targeting behavioral drivers of reduced meat consumption.

1. Introduction

In recent years, studies have clearly shown that the substitution of animal-based foods, particularly red and processed meat, with plant-based alternatives in daily diets has considerable beneficial effects on both human health and environmental sustainability (Costa et al., 2023; Dussiot et al., 2023; Yu et al., 2023; IPPC, 2022; EU, 2021; Aiking & de Boer, 2020; Clark et al., 2019; Bonnet et al., 2020; Willett et al., 2019; Springmann et al., 2016). The World Health Organization (WHO) recommends limiting the consumption of red meat to no more than three servings per week, classifying it as a "probable carcinogen," and avoiding the consumption of processed meat, classified as a "group one carcinogen," due to its association with an increased risk of cardiovascular disease and type 2 diabetes (IPPC, 2022; EU, 2021). Moreover, high red meat consumption and production contribute considerably to water pollution and greenhouse gas emissions from ruminant agriculture, with significant implications for climate change (Herrero et al., 2013; Romanello et al., 2022). Notwithstanding this evidence and the strong social pressures resulting from health and environmental concerns (IPPC, 2022; EU, 2021; Springmann et al., 2016), a considerable proportion of consumers remain unmotivated to reduce their red meat consumption significantly. Recent studies (Aschemann-Witzel & Janssen, 2022) indicate that, in developed countries, only a small percentage of individuals identify as vegan/vegetarian (less than 10%) or flexitarian (approximately 30%), *i.e.:* individuals holding an intention to reduce their meat consumption. Whereas, more than 50% of consumers exhibit resistance to change and report no intention of reducing their meat consumption. Together with the cultural and psychosocial attributes associated with red meat consumption, as a symbol of wealth, masculinity, and nutrition, this eating behavior is deeply rooted in Western society, as evidenced by the prevalence of meat as a central component in most dishes (de Gavelle et al., 2019). Factors such as dietary habits (Harguess et al., 2020; Hartmann & Siegrist, 2020), taste preferences, lack of skills in preparing vegetarian dishes (Mullee et al., 2017), social norms (Amiot et al., 2018) and emotional attachment to meat (Graça et al., 2015) – considered a normal, natural and necessary practice

* Corresponding author at: University of Naples Federico II, Department of Economics and Statistics Monte S.Angelo, via Cintia 21, Naples, Italy
E-mail addresses: gerarda.caso@unina.it (G. Caso), laura.trinchera@neoma-bs.fr (L. Trinchera), rosaroma@unina.it (R. Romano), riccardo.vecchio@unina.it (R. Vecchio).

https://doi.org/10.1016/j.foodqual.2025.105610
Received 5 February 2025; Received in revised form 7 May 2025; Accepted 4 June 2025
Available online 12 June 2025

(Piazza et al., 2015) – have been identified as key barriers to reducing consumption.

Campaigns aiming to promote healthier and more sustainable diet by reducing red and processed meat consumption in Western countries should account for personal and cultural barriers, with particular attention paid to excessive meat eaters, defined as individuals reporting consumption of red and processed meat more than four times per week over a four-week period, who have been shown to exhibit lower willingness to modify their dietary habits compared to flexitarians (Randers & Thøgersen, 2023). In this context, the present pre-registered[1] study aims to identify the motivating factors and underlying processes influencing the intentions of individuals with excessive meat consumption patterns to reduce their meat consumption. The goal is to develop practical insights that can feed the design of effective campaigns targeting behavioral intentions and ultimately lead to meaningful change.

Using the Theory of Planned Behavior (TPB) (Ajzen, 1991) as a foundational theoretical framework, this study aims to advance understanding of the factors influencing excessive meat consumers' intentions to reduce their consumption. This research contributes to a rich corpus of literature that applies TPB to explore and deepen insights into consumer behavior related to dietary changes, particularly regarding meat reduction (Castellini & Graffigna, 2024; Zhu et al., 2024; Randers & Thøgersen, 2023; Wolstenholme et al., 2021; Wang & Scrimgeour, 2021; Carfora et al., 2020; Gavelle et al., 2019). Additionally, this study enriches the broader TPB literature on sustainable behaviors (Alzubaidi et al., 2021; Leonidou et al., 2022; Punzo et al., 2019; Zaremohzzabieh et al., 2021), offering insights into the factors that support consumers' behavior change in the context of sustainable and healthy behaviors.

Our study contributes to the literature in several important ways. First, the focus is on excessive consumers of red and processed meat, those who declare to consume it more than four times per week, a group particularly vulnerable to negative health consequences, whose behavioral and motivational dynamics might differ from the general population (usually investigated in previous similar studies). Second, this study extends the classic TPB model by introducing new constructs aimed at providing a more accurate understanding of the behavioral intentions of this specific target population. Additionally, while prior research has shown that motivations for reducing meat consumption vary across countries due to cultural, culinary, and economic differences (Borusiak et al., 2022; Wang & Scrimgeour, 2021; Wolstenholme et al., 2021), this study seeks to examine whether targeting the specific consumer segment of individuals who consume red and processed meat more than four time per week could enable the generalization of findings and the development of effective campaigns that transcend national contexts. Such an approach aims to provide a broader understanding of consumer behaviors and choices related to high meat consumption in Western countries. To this end, we conduct a cross-country comparison between Italy and France, two countries with red and processed meat consumption per capita exceeding the European average (2022 data[2]: France 84.6 kg; Italy 73.6 kg). Furthermore, both countries have strong culinary traditions centered around red meat (Bonnet et al., 2020, 2018), and high local production, with Italy and France accounting for 12% and 10% of EU meat processors, respectively[3].

The remainder of this paper is organized as follows. Section 2 provides an overview of the theoretical background and develops the hypotheses for this study. Sections 3 and 4 detail the methodology and present the results, respectively. Section 5 discusses the implications and interpretations of the empirical investigation, addresses core limitations, and suggests avenues for future research.

2. Theoretical background and hypotheses development

The Theory of Planned Behavior (TPB) suggests that behavioral intention is the primary predictor of actual behavior, with stronger intentions leading to a higher likelihood of performing the behavior (Ajzen, 1991). According to the TPB the intention is explained by three factors: attitude (the evaluation of engaging in the behavior), social norms (perceived social pressure), and perceived behavioral control (confidence in one's ability to perform the behavior). Consumers are more likely to engage in a behavior when they view it positively, believe it is socially approved, and feel capable of doing it. Studies relying on TPB framework have found mixed results regarding the role of each construct in explaining intentions and behavior. This is because the predictive ability of TPB constructs depends on the type of behavior, the situational circumstances under which the behavior occurs, and the measurement used for the constructs (Ajzen, 2002). For example, while many prior studies (Aitken et al., 2020; Dorce et al., 2021) have indicated that attitude exerts the most significant influence on consumer intentions (Al-Swidi et al., 2014; Michaelidou & Hassan, 2010), conflicting findings exist concerning the impact of social norms and perceived behavioral control on behavioral intentions (Randers & Thøgersen, 2023; Stefan et al., 2013; Thangavelu et al., 2022). Overall, a large percentage of unaccounted variance has been found in several studies, leading to the suggestion of including additional predictor variables to improve the explanatory power of the model (Kaiser, 2006).

Although the Theory of Planned Behavior (TPB) has been extensively applied to investigate sustainable behaviors (Alzubaidi et al., 2021; Punzo et al., 2019; Zaremohzzabieh et al., 2021), its sufficiency in fully capturing the complexity of behavioral intentions has been debated (Conner & Armitage, 1998). In response, recent research has aimed to enrich the TPB framework by integrating additional theoretical constructs to more comprehensively account for the factors influencing intentions to reduce red and processed meat consumption.

For instance, Zhu et al. (2024) combined the TPB with the Norm Activation Model (NAM) to examine determinants of bushmeat consumption intentions; Carfora et al. (2020) combined the TPB with the Value-Belief-Norm (VBN) framework; Wolstenholme et al. (2021) integrated components of the Transtheoretical Model; and Castellini and Graffigna (2024) investigated the moderating role of emotional balance in the intention-behavior relationship regarding meat reduction. Collectively, these studies support the strong predictive capacity of the TPB, particularly when supplemented with complementary constructs, in explaining consumer intentions to reduce meat consumption.

Building on these premises, this study extends the classical TPB model by including personal norms (Bamberg et al., 2007) as a mediator in the relationship between social norm, perceived behavioral control, and attitude. Additionally, it integrates food choice motives (Onwezen et al., 2019) as direct antecedents of the intention to reduce red and processed meat consumption, as shown in Fig. 1. The study further examines whether the factors that explain reduction intentions among consumers who report consuming red and processed meat more than four times per week remain consistent across countries (Randall et al., 2024) and across specific sociodemographic groups (Ruzgys & Pickering, 2024; Fantechi et al., 2024).

2.1. The determinants and outcome of intentions: introducing the Food Choice Motive scale as a new driver for the intention

In line with traditional TPB the Attitude is a pivotal factor in enacting specific behaviors. Drawing on previous research (de Gavelle et al., 2019; Thangavelu et al., 2022), we posit that attitude plays a crucial role in shaping consumers' propensity to decrease their consumption of red

[1] Our study has been pre-registered on the Open Science Framework, and the registration details are available at the following link: https://osf.io/a3jzd/.

[2] Meat Consumption by Country 2025. Available at: https://worldpopulationreview.com/country-rankings/meat-consumption-by-country.

[3] Red Meat in the EU. Available at: https://assets.ctfassets.net/pn8wbiqtnzw9/7wjOmdbJlaDV4BeWRtLfVp/25f1a560b0ed048b6841ad42dd6255cc/Red_Meat_in_the_European_Union_-_Understanding_demand_for_red_meat_in_Europe__s_key_markets.pdf.

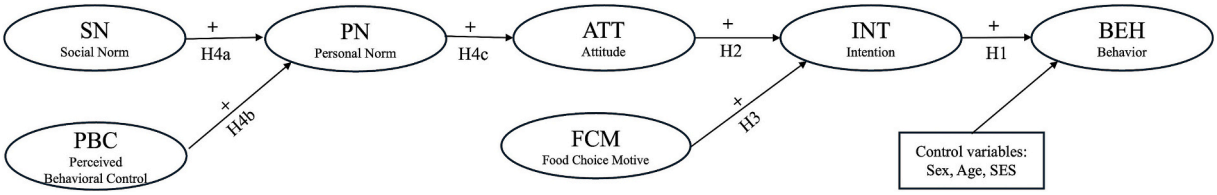

Fig. 1. Extended Theory of Planned Behavior framework.

and processed meat. Subjective assessments of attitude, such as perceiving that reducing red and processed meat consumption yields personal health advantages or positively affects the environment, directly influence behavioral intentions, which, in turn, can drive self-reported meat reduction behavior. Thus, we formulated the following two research hypotheses:

H1: *The intention to reduce red and processed meat consumption positively influences the self-reported behavior of excessive consumers.*

H2: *A positive attitude toward reducing red and processed meat consumption positively influences the behavioral intentions of excessive consumers.*

The Food Choice Motive (FCM) scale captures a broad and nuanced spectrum of consumer motivations underlining food choice (Onwezen et al., 2019). These motives encompass not only health and environmental concerns, but also emotional regulation, affordability, convenience, sensory pleasure, naturalness, animal welfare, fairness, familiarity, and weight control.

Collectively, they reflect the degree to which consumers engage in conscious and motive-driven food choices. Understanding how the importance placed on such conscious, motive-driven choices impacts intentions to reduce red and processed meat consumption could offer valuable insights to craft interventions, campaigns, and initiatives aimed at promoting healthier and more sustainable dietary behaviors, particularly among consumers reporting excessive red and processed meat consumption. Previous studies have demonstrated that various food-related motivations, particularly health consciousness, sustainability concerns, and economic factors, are associated with an increased openness to adopting plant-based or meat-reduced diets (Vainio, 2019; Van Loo et al., 2017). Differently from the study by Wang and Scrimgeour (2021) that used only two motivational factors (*i.e.,* health concerns and environmental concerns) in an extended TPB model, our study involves all the dimensions included in the Food Choice Motives (FCM) scale developed by Onwezen et al. (2019). Consistent with earlier findings indicating a substantial and favorable effect of FCMs on readiness to embrace a more plant-centric diet (Wang & Scrimgeour, 2021), we posit the following hypothesis:

H3: A greater importance placed on conscious, motive-driven food choices, including health consciousness, sustainability and ethical concerns, and convenience, is positively associated with the intention to reduce red and processed meat consumption among excessive consumers.

2.2. The determinants and outcome of personal norms: the mediation role of the personal norms in the relation between social norms, perceived behavioral control and attitude

Extensive research has provided evidence of the association between social and personal norms. A personal norm is "… an individual's belief that acting in a certain way is right or wrong" (Bamberg et al., 2007, *p.* 191). This notion encompasses various internal convictions, including guilt, moral duty, accountability, values, and ethics and is typically assessed as a composite of these elements (Shin et al., 2018; Visschers et al., 2016). Social norms (or subjective norms) measure how socially acceptable or unacceptable a specific behavior is, thus guiding consumers in determining their belief about whether the behavior is right for themselves (Byun & Jang, 2019; Minton et al., 2018; Onwezen et al., 2013). Based on previous studies (Han et al., 2019; Kim & Hwang, 2020; Nascimento & Loureiro, 2024; Park & Lin, 2020), it is reasonable to expect that social pressure from family and friends - whether promoting the reduction of red and processed meat consumption for ethical, environmental, or health reasons, or expressing confidence in an excessive consumer's ability to cut back - can enhance consumers self-efficacy. This increase in self-efficacy may, in turn, influence personal norms that reflect conformity to social expectations. Therefore, we hypothesize that:

H4a: *Perceived social pressure (i.e., social norms) positively influences personal norms.*

Similarly, perceived behavioral control can play a significant role in personal norms because it influences consumers perception of their ability to change their behavior. Numerous studies have supported the idea that voluntary control is a precondition for moral responsibility (Smith, 2008). However, only a few studies in the field of food choice have tested this relationship (Carfora et al., 2020). In this regard, perceiving the ability to successfully tackle nonroutine behavior (such as reducing red and processed meat consumption) can boost meat consumers' confidence in their ability to implement such a change, and consequently, this self-efficacy can positively influence personal norms. Therefore, we hypothesize as follows:

H4b: Perceived behavioral control positively influences personal norms.

Moral values have been shown to be significant antecedents of attitude, rather than intentions (Carfora et al., 2020; Fornara et al., 2016; Thompson et al., 2015; Klöckner, 2013). Furthermore, attitudes toward healthy behaviors comprise a range of evaluations in which personal norms play a significant role (Onwezen, Verain and Dagevos, 2022; Thompson et al., 2015). Previous studies have consistently found that personal norms predict environmental attitudes (Fornara et al., 2016). In this regard, a positive attitude toward reducing red and processed meat consumption can be fueled by intrinsic motivation stemming from consistency with personal norms. Therefore, we hypothesize the follow:

H4c: Personal norms positively impact attitudes toward reducing red and processed meat consumption of excessive consumers,

H4d: Personal norms fully mediate the relation between social norms, perceived behavioral control, and attitude and positively influence attitudes toward reducing red and processed meat consumption of excessive consumers.

2.3. Cross-country invariance and control variables effects

To date, few studies (Borusiak et al., 2022; Wang & Scrimgeour, 2021; Wolstenholme et al., 2021) have simultaneously examined behavioral intentions to reduce meat consumption or willingness to adopt sustainable plant-based alternatives in a cross-national context. Except for Borusiak et al. (2022), who considered culturally and culinarily similar countries such as Poland and Slovakia (although with different levels of meat consumption), other studies have compared countries with very different dietary and cultural traditions. For example, Wang and Scrimgeour (2021) compared China and New Zealand, whereas Wolstenholme et al. (2021) compared Italy and the United Kingdom. Such research has demonstrated notable discrepancies in the influence of TPB constructs on intention to reduce meat consumption.

Our study aims to investigate whether focusing on the specific consumer segment of excessive consumers, defined as individuals who declare to consume red and processed meat more than four times per

week over a four-week period, could help identify common behavioral predictors that apply to consumers in Western countries, regardless of their specific country of residence. For this purpose, we collected data from two Western countries, Italy and France, renowned for their high levels of meat consumption and local production, and strong culinary traditions centered around red meat (Bonnet et al., 2020, 2018), and hypothesized that:

H5: The behavioral model explaining intentions to reduce red and processed meat consumption is invariant for excessive consumers in both Italy and France.

Previous studies have identified several sociodemographic characteristics that influence red and processed meat consumption and the motivations to reduce it (see Graça, Godinho, et al., 2019; Stoll-Kleemann & Schmidt, 2017 for reviews). The effects of age, gender, and socioeconomic status (SES) on sustainable behaviors have been widely discussed in the literature (Diamantopoulos et al., 2003; Odou & Schill, 2020). Fantechi et al. (2024) shows that the inclination to reduce red meat consumption varies by gender. Research indicates that males typically exhibit a lower inclination to reduce red meat consumption (Çoker & van der Linden, 2022), whereas females generally display a higher inclination to reduce red meat consumption (Seffen & Dohle, 2023). The literature presents contrasting findings on the relationship between red meat consumption and age (Graça, Godinho, et al., 2019). However, Generation Z may play a pivotal role in advancing sustainable food systems (Gidaković et al., 2024; Ruzgys & Pickering, 2024). Although consuming significant quantities of meat has traditionally been linked to affluence and opulence in numerous countries, individuals with high SES in Western societies are increasingly inclined to consume less red and processed meat (Graça, Truninger, et al., 2019; Klink et al., 2022). In line with previous literature, our study included gender, age, and SES variation as control variables in the theoretical model (Ahmad et al., 2020).

3. Methodology

A cross-sectional study was conducted using a convenience sample of French and Italian consumers recruited trough a professional panel provider, Qualtrics XM, after obtaining ethical approval for the study protocol by the host institution from one of the authors. Only consumers aged 18 years or older who stated that they consume red and processed meat more than four times per week were included in the survey. A pilot test with 50 participants in each country was conducted, and minimal changes were made to improve the meaning of some items. The sample consists of 1037 consumers from Italy (n = 513) and France (n = 524). This sample size is adequate to ensure sufficient statistical power for the analyses conducted in this study, as detailed in Section 4.4.

3.1. Participants

Table 1 provides the details of the sample composition. Respondents were almost equally distributed between France (49%) and Italy (51%). The average age of respondents was approximately 36 years, with a fair proportion of women and men. Most of the respondents were married or living with a partner (68%), with a small percentage divorced (3.2%), although this was slightly higher in the French participants (4%). More than half of the respondents reported having no children (52%). The family composition varies slightly between the two countries, with families in France being larger (7% of French respondents reported to have three or more children against 4% of Italian respondent). The education level was comparable between the two countries, with 53% of the sample at the pooled level declaring a high education level. Moreover, 53% of the participants at the pooled level declared an economic position with low income; this proportion was slightly higher among French respondents (59%). Most respondents (79.8%) stated to be the leading food buyers at home, preparing food at least four times a week (80.5%). Overall, 55.7% of the participants reported consuming red and

Table 1
Demographic profile of respondents.

		France (n = 513)	Italy (n = 524)	Total (N = 1.037)
Age		M = 33.89 *SD* = 10.93	M = 37.78 *SD* = 12.15	M = 35.86 *SD* = 11.72
Gender	*Male*	242 (47.2%)	277 (52.9%)	519 (50.0%)
	Female	271 (52.8%)	247 (47.1%)	518 (50.0%)
Weight	*Underweight*	36 (7.0%)	32 (6.1%)	68 (6.6%)
	Normal weight	363 (70.8%)	374 (71.4%)	737 (71.1%)
	Overweight	114 (22.2%)	118 (22.5%)	232 (22.4%)
Education	*None*	54 (10.5%)	46 (8.8%)	100 (9.6%)
	High School	164 (32.0%)	231 (44.1%)	395 (38.1%)
	Bachelor	159 (31.0%)	99 (18.9%)	258 (24.9%)
	Master	75 (14.6%)	110 (21.0%)	185 (17.8%)
	Postmaster	61 (11.9%)	38 (7.3%)	99 (9.5%)
Income	*Very low*	89 (17.3%)	72 (13.7%)	161 (15.5%)
	Low	216 (42.1%)	174 (33.2%)	390 (37.6%)
	Average	147 (28.7%)	210 (40.1%)	357 (34.4%)
	High	61 (11.9%)	68 (13.0%)	129 (12.4%)
Marital status	*Divorced*	20 (3.9%)	13 (2.4%)	33 (3.2%)
	Living with a partner	143 (27.9%)	141 (26.9%)	284 (27.4%)
	Married	206 (40.2%)	207 (39.5%)	413 (39.8%)
	Single	140 (27.3%)	159 (30.3%)	299 (28.8%)
	Widowed	4 (0.8%)	4 (0.8%)	8 (0.8%)
Number of children	*None*	240 (46.8%)	298 (56.9%)	538 (51.9%)
	1	141 (27.5%)	118 (22.5%)	259 (25.0%)
	2	94 (18.3%)	96 (18.3%)	190 (18.3%)
	3	31 (6.0%)	8 (1.5%)	39 (3.8%)
	> 3	7 (1.4%)	4 (0.8%)	11 (1.1%)
Food Shopping	*Never*	3 (0.6%)	5 (1.0%)	8 (0.8%)
	Occasionally	9 (1.8%)	24 (4.6%)	33 (3.2%)
	Equally	83 (16.2%)	85 (16.2%)	168 (16.2%)
	Mostly	106 (20.7%)	115 (21.9%)	221 (21.3%)
	Always	312 (60.8%)	295 (56.3%)	607 (58.5%)
Cooking responsibilities (weekly)	*Never*	2 (0.4%)	4 (0.8%)	6 (0.6%)
	Seldom	9 (1.8%)	9 (1.7%)	18 (1.7%)
	One	21 (4.1%)	18 (3.4%)	39 (3.8%)
	2 or 3	49 (9.6%)	80 (15.3%)	129 (12.4%)
	4 or 5	110 (21.4%)	113 (21.6%)	223 (21.5%)
	5_or_more	322 (62.8%)	300 (57.3%)	622 (60.0%)
Red meat consumption (weekly)	*4 or 5*	316 (61.6%)	262 (50.0%)	578 (55.7%)
	5 or more	197 (38.4%)	262 (50.0%)	459 (44.3%)
Reasons	*No*	366 (71.3%)	391 (74.6%)	757 (73.0%)
	Yes	147 (28.7%)	133 (25.4%)	280 (27.0%)

processed meat four to five times per week over the previous four weeks, while 44.3% indicated consuming it more than five times per week during the same period. The proportion of respondents who declared having consumed red and processed meat more than five times per week over the previous four weeks is slightly smaller among the French respondents (38.4%) than at the pooled level. Furthermore, 27% of the respondents reported that religious beliefs, food allergies, or other health reasons prevented them from consuming certain types of red or processed meat (e.g., pork). This proportion is nearly identical between French and Italian respondents.

3.2. Measures

The questionnaire was developed in English using previously validated measurement scales and translated into Italian and French by a professional translation office. Back-translation was applied to ensure the meaning of the items on each scale. Web-based surveys were pretested on two small convenience samples in two consecutive waves (data were not included in the final sample) to assess clarity and superficial validity. The questionnaire was organized in accordance with the guidelines of Jaeger and Cardello (2022) to optimize data quality and lasted 8 minutes on average. Once the screening questions were passed, the respondents answered items measuring the different constructs presented in the conceptual model (Fig. 1). Specifically, six items adapted from the work of Pandey et al. (2021) measured respondents' attitudes toward sustainability, healthiness, and ethics of reducing red and processed meat consumption (ATT). Three items on social norms (SN) (Carfora et al., 2017) and three on personal norms (PN) (Carfora et al., 2020) assessed whether excessive meat consumers felt social or personal pressure to change their habitual behavior. Three items on perceived behavioral control (PBC) and three items on intentions (INT) were adapted from Wolstenholme et al. (2021). Reduction behavior (BEH) was measured using three items adapted from the study by Wan et al. (2012). The wording of each item is detailed in Table A1 in the Appendix.

Respondents indicated their level of agreement or disagreement with each statement using a 7-point Likert scale (*i.e.,* 1 = strongly disagree and 7 = strongly agree). Additionally, they rated the relevance of 11 different attributes during their daily food choices using the FCM scale (Onwezen et al., 2019), with a 7-point scale ranging from 1 (not at all important) to 7 (very important). Each of the 11 items in the FCM scale (Onwezen et al., 2019) represents a distinct motive, collectively measuring consumers' food choice motivations. The descriptive statistics for the items are presented in Table 2.

3.3. Statistical analyses

The quality of the measurement model was assessed through confirmatory factor analysis (Kline, 2023). The reliability of each construct was evaluated using common reliability measures such as Average Variance Extracted (AVE), Cronbach's alpha (α), and omega coefficient (Trizano-Hermosilla & Alvarado, 2016). In addition, the lower limit of the 95% Confidence Interval (CI) of Cronbach's α was evaluated (Trinchera et al., 2018). A Structural Equation Model (SEM) (Bollen, 2014) was subsequently used to test the proposed model. Considering that multivariate normality was not verified in our data (Mardia's test statistic: 16200.34, $p < 0.001$), we adhered to Maydeu-Olivares (2017) advice and employed the maximum likelihood estimator with robust standard errors and a mean-and-variance adjusted test statistic (MLMV) (Asparouhov & Muthén, 2010). Model fit was assessed using the Satorra–Bentler scaled test statistic (mean-adjusted), SBc^2, the Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker–Lewis Index (TLI) (Hu & Bentler, 1999; Satorra & Bentler, 2001). Additionally, to avoid relying solely on predetermined threshold values, we included the significance level associated with the null hypothesis of a population RMSEA < 0.05 and the 90% CI bounds for the robust RMSEA value as additional fit indicators. Moreover, to further assess the model fit, we referred to the ratio of the chi-square associated with the model and its degrees of freedom (Jöreskog & Sörbom, 1993). Discriminant validity was evaluated using the heterotrait-monotrait ratio of correlations (HTMT) (Henseler et al., 2015), and the statistical significance of the indirect effects was tested using bootstrap-based standard errors. To test for differences/similarities between the SEMs resulting from the Italian and French single samples, a cross-country measurement invariance analysis and a cross-country structural invariance analysis were conducted (for further details, see Section 4.3). All statistical analyses were performed in RStudio 2022.07.2, using *lavaan* R package, version 0.6-12 (Rosseel, 2012), *semTools* R package, version 0.5-6 (Jorgensen et al., 2022) and the *semPower* R package, version 2.1.1 (Moshagen & Erdfelder, 2016).

3.4. Common Method Bias

The results were tested for Common Method Bias (CMB; Podsakoff & Organ, 1986; Podsakoff et al., 2003) using the post-hoc marker variable approach (Lindell & Whitney, 2001; Malhotra et al., 2006). The stability of the estimated path coefficients' magnitudes and significance levels post-CMB correction implies that CMB does not pose a significant issue in our research. For a detailed comparison of the path coefficient estimates before and after CMB correction, please refer to Table A3 in the Appendix.

4. Results

4.1. Measurement model

Table 3 outlines the estimates for Cronbach's α and their corresponding 95% CIs, as well as the composite reliability (CR) and the average variance extracted (AVE) values. The 95% CIs' lower limits for Cronbach's α, calculated at the pooled level, are higher than 0.78 for all constructs except the Perceived Behavioral Control (PBC) scale, signifying robust internal consistency. The CR and AVE metrics demonstrate adequate reliability of the scales except the PBC and FCM scales. This is due to a moderate internal consistency observed for the PBC scale in the French sample (Cronbach's α = 0.53; CI_0.95 = 0.44; 0.62) concerning the Italian one (Cronbach's α = 0.75; CI_0.95 = 0.70; 0.80). Factor loading point estimates are all above 0.69, supporting a good validity of the measurement model (for more details, including their respective 95% CIs, see Table A2 in the Appendix). All HTMT values (Table 4) are largely below the most conservative threshold of 0.85, as proposed by Kline (2010). We can conclude that the discriminant validity among the latent constructs in our theoretical model is verified.

4.2. Structural model

The theoretical model depicted in Fig. 1 exhibits an acceptable fit to the data (n = 1037; $SB\chi2$ = 1832.10 with 734 df; robust CFI = 0.86; robust TLI = 0.85; SRMR = 0.08; robust RMSEA = 0.06, 95% CI = 0.05; 0.06) (Browne & Cudeck, 1992; Kline, 2010; MacCallum et al., 1996). The ratio between the $SB\chi2$ and the model's degrees of freedom equals 2.50, supporting an acceptable fit of the model (Schermelleh-Engel et al., 2003). Our theoretical model accounts for 58% of the variance in the intention to reduce red and processed meat consumption and 60% of the variance in self-reported reduction behavior.

Table 5 shows the standardized path coefficient estimates for all the hypothesized relations and control variables. All our research hypotheses are supported at a significance level of $p < 0.001$. Regarding H1, the results show that excessive meat eaters' intention to reduce red and processed meat consumption positively influences self-reported reduction behavior ($\beta = 0.77$, $p < 0.001$). Furthermore, our findings indicate that among consumers with excessive red and processed meat

Table 2
Descriptive statistics of construct items ($N = 1037$).

Item	Mean	Sd	Median	Min	Max	Range	Skew	Kurtosis
SN1	3.92	1.80	4	1	7	6	−0.09	−0.92
SN2	4.42	1.61	4	1	7	6	−0.34	−0.42
SN3	4.09	1.83	4	1	7	6	−0.21	−0.96
PBC1	4.63	1.76	5	1	7	6	−0.63	−0.46
PBC2	4.56	1.57	5	1	7	6	−0.57	−0.17
PBC3	4.50	1.62	5	1	7	6	−0.62	−0.29
PN1	4.02	1.80	4	1	7	6	−0.12	−0.92
PN2	4.30	1.69	4	1	7	6	−0.36	−0.57
PN3	4.19	1.79	4	1	7	6	−0.30	−0.80
ATT1	4.58	1.77	5	1	7	6	−0.32	−0.75
ATT2	4.57	1.72	5	1	7	6	−0.34	−0.72
ATT3	4.54	1.64	5	1	7	6	−0.37	−0.54
ATT4	4.75	1.67	5	1	7	6	−0.51	−0.41
ATT5	4.86	1.66	5	1	7	6	−0.42	−0.60
ATT6	4.63	1.67	5	1	7	6	−0.43	−0.53
INT1	4.34	1.77	4	1	7	6	−0.29	−0.79
INT2	4.59	1.74	5	1	7	6	−0.53	−0.51
INT3	4.51	1.73	5	1	7	6	−0.48	−0.54
BEH1	4.17	1.75	4	1	7	6	−0.22	−0.82
BEH2	4.15	1.75	4	1	7	6	−0.29	−0.79
BEH3	4.23	1.77	4	1	7	6	−0.31	−0.80
FCM1	5.06	1.55	5	1	7	6	−0.42	−0.55
FCM2	5.11	1.41	5	1	7	6	−0.66	0.31
FCM3	5.11	1.37	5	1	7	6	−0.50	−0.05
FCM4	5.35	1.37	5	1	7	6	−0.54	−0.35
FCM5	5.20	1.36	5	1	7	6	−0.55	−0.02
FCM6	5.21	1.38	5	1	7	6	−0.52	−0.13
FCM7	4.98	1.50	5	1	7	6	−0.53	−0.08
FCM8	4.93	1.45	5	1	7	6	−0.47	−0.08
FCM9	4.96	1.45	5	1	7	6	−0.43	−0.26
FCM10	5.05	1.48	5	1	7	6	−0.50	−0.28
FCM11	4.94	1.51	5	1	7	6	−0.47	−0.27

Table 3
Constructs' reliability measures ($N = 1037$).

Constructs	α [95% C.I.][a]	CR	AVE
Attitude (ATT)	0.874 [0.859; 0.889]	0.874	0.540
Social Norms (SN)	0.815 [0.790; 0.839]	0.823	0.611
Personal Norms (PN)	0.807 [0.780; 0.833]	0.808	0.585
Perceived Behavioral Control (PBC)	0.683 [0.641; 0.725]	0.692	0.434
Intention (INT)	0.903 [0.888; 0.918]	0.903	0.757
Behavior (BEH)	0.868 [0.849; 0.886]	0.869	0.688
Food Choices Motives (FCM)	0.867 [0.852; 0.882]	0.866	0.376

[a] The values within parentheses represent the limits of the 95% Confidence Interval calculated following Trinchera et al., 2018.

Table 4
Correlation and HTMT values among the latent constructs ($N = 1037$).

	ATT	SN	INT	BEH	PBC	PN	FCM
ATT		0.584	0.756	0.584	0.358	0.753	0.272
SN	0.575		0.471	0.363	0.440	0.776	0.417
INT	0.717	0.668		0.772	0.306	0.586	0.310
BEH	0.549	0.615	0.769		0.236	0.453	0.240
PBC	0.461	0.442	0.410	0.317		0.475	0.409
PN	0.659	0.758	0.804	0.740	0.305		0.361
FCM	0.455	0.338	0.336	0.313	0.367	0.283	

Notes: The upper section displays the estimated correlations, and the values in the lower part are the HTMT values.

consumption, a positive attitude toward reducing consumption significantly influences their behavioral intentions to cut back ($\beta = 0.73$, $p < 0.001$), supporting H2. The results also reveal a significant positive effect of the FCM scale on the intention to reduce red and processed meat consumption ($\beta = 0.11$, $p < 0.001$). Indeed, attention to food healthiness, sustainability, and convenience during daily food purchases significantly influences the intentions of excessive red and processed meat consumers to reduce their consumption, thereby confirming H3. Personal norms are significantly and positively influenced by social norms ($\beta = 0.70$, $p < 0.001$) and perceived behavioral control ($\beta = 0.17$, $p < 0.001$), supporting both H4a and H4b. In turn, these norms significantly positively impact attitudes toward reducing red and processed meat consumption ($\beta = 0.75$, $p < 0.001$), confirming H4c. The indirect effects of social norms ($\beta = 0.53$, $p < 0.001$) and perceived behavioral control ($\beta = 0.13$, $p < 0.001$) on consumers' attitudes toward reducing red and processed meat consumption are both significant, confirming H4d and supporting the full mediation role of personal norms on both relations. Regarding sociodemographic variables, while gender and age show non-significant effects in our theoretical model, socioeconomic status, as measured by income and education levels, shows statistically significant differences.

4.3. Cross-country invariance

We conducted an analysis to assess the robustness of our theoretical model across France and Italy. Initially, we evaluated the model's cross-country measurement invariance between French and Italian consumers. This required a comparative analysis of nested models, gradually growing the levels of invariance from configural to scalar invariance. The comparison of the fit for the nested models, conducted through both the chi-square difference test and the root mean square error of approximation difference (RMSEAD) method, as proposed by Savalei et al. (2024), enabled us to confirm metric invariance ($p = 0.99$; see Table A4 in the Appendix). We evaluated our model for scalar invariance, using the metric invariance model as a reference. The comparison between the metric and the scalar models revealed a significant chi-square difference ($\Delta\chi^2 = 47.56$, df = 25, $p = 0.004$). However, with such a large sample size, as in our study, even small-scale

Table 5
Standardized path coefficients ($N = 1037$).

Hypothesis	Path	Beta	S.E.	t-statistic	*p*-value	Supported
H1	INT ➔ BEH	0.772	0.026	29.926	<0.001	Yes
H2	ATT ➔ INT	0.725	0.023	31.302	<0.001	Yes
H3	FCM ➔ INT	0.113	0.029	3.856	<0.001	Yes
H4a	SN ➔ PN	0.703	0.036	19.675	<0.001	Yes
H4b	PBC ➔ PN	0.166	0.044	3.737	<0.001	Yes
H4c	PN ➔ ATT	0.753	0.022	33.879	<0.001	Yes
H4d	Indirect effect of SN on ATT via PN	0.529	0.032	16.544	<0.001	Yes
	Indirect effect of PBC on ATT via PN	0.125	0.034	3.707	<0.001	Yes
Control Variables	AGE	-0.002	0.024	-0.100	0.920	No effect
	EDU_HighSchool	0.038	0.045	0.844	0.399	No effect
	EDU_Bachelor	0.024	0.041	0.587	0.557	No effect
	EDU_Master	0.085	0.039	2.152	0.031	Effect
	EDU_PostMaster	0.037	0.034	1.083	0.279	No effect
	INC_Low	-0.035	0.039	-0.902	0.367	No effect
	INC_Average	-0.090	0.039	-2.318	0.020	Effect
	INC_High	-0.090	0.034	-2.63	0.009	Effect
	SEX_Female	-0.026	0.024	-1.062	0.288	No effect

differences in fit are significant. By comparing the fit of the two nested models in terms of robust CFI and robust RMSEA, it is clear that they fit the same. Additionally, the small value[4] of the $RMSEA_D$ index supports the equivalence of the fit of Models 2 and 3 and thus scalar invariance among the French and Italian samples. The same logic applies when comparing the fit of Model 3 to that of Model 4, but this time, the $RMSEA_D$ value is slightly higher than the 0.08 threshold indicated by Zhang et al. (2022), suggesting that residual invariance is not verified in our study.

After establishing scalar invariance, French and Italian samples were compared with respect to their structural model parameters. The path coefficients estimated for both samples independently, under the assumption of scalar invariance, are presented in Table A5 in the Appendix. To test structural invariance, the fit of the model assuming scalar invariance while allowing for differing path coefficients between the French and Italian samples ($N = 1037$; $SB\chi^2 = 2555.25$ with 1518 df; robust CFI = 0.84; SRMR = 0.08; robust RMSEA = 0.06 and its 95% CI = 0.056; 0.064) was compared to the fit of the model assuming metric invariance with equal path coefficients ($N = 1037$; $SB\chi^2 = 2576.58$ with 1533 df; robust CFI = 0.84; SRMR = 0.08; robust RMSEA = 0.06 and its 95% CI = 0.05; 0.06). Both models fit the same, as indicated by the non-significant chi-square difference ($\Delta\chi^2 = 12.13$, df = 15, $p = 0.67$). Additionally, the small value of $RMSEA_D$ ($RMSEA_D = 0.03$) supports the hypothesis that the two nested models fit the data equally. Accordingly, a more parsimonious model, which assumes equality in the path coefficients among the French and Italian samples, is preferred. These findings provide strong evidence supporting that the behavioral model explaining the determinants of reduced red and processed meat consumption is consistent among excessive consumers in both France and Italy, thereby supporting H5.

4.4. Post-hoc power analyses

We conducted several post hoc power analyses to assess the sufficiency of our sample size for testing the study hypotheses, specifically when examining the overall model fit and the equivalence of two nested models via chi-square difference tests for assessing measurement and structural invariance. The results of the first post hoc power analysis indicated that, with a total sample size of N = 1,037 and an alpha level of 0.05, the statistical power to detect a model misspecification corresponding to an RMSEA of at least 0.050 in a model with 734 degrees of freedom was 99%. At the country level, assuming a sample size of 500, lower than the actual sample sizes for both Italy and France, the power remained consistently high at 99%. Furthermore, we assessed the power of the chi-square difference tests under the null hypothesis of equivalent fit between two nested models. For the measurement invariance test (df = 25) and the structural invariance test (df = 15), the post hoc power analysis revealed power estimates of 83% and 79%, respectively, assuming an effect size of 0.05, an alpha level of 0.05 and a sample size of 500.

5. Discussion

This study aims to deepen the understanding of the factors influencing the intention to reduce red and processed meat consumption among excessive consumers, defined as individual who report consuming red and processed meat more than four times per week, in France and Italy. Consistent with the literature, our findings confirm that intentions to reduce red and processed meat consumption positively and significantly influence self-reported reduction behavior. This suggests that even among excessive meat consumers minimal intentions to reduce red and processed meat consumption may still lead to behavioral change (de Gavelle et al., 2019). Similarly, a positive attitude toward reducing red and processed meat consumption significantly and positively influences behavioral intentions to reduce consumption. When consumers perceive the benefits of reducing red and processed meat consumption, such as improvements in personal health or positive environmental impacts, they are more likely to be motivated to do so. Consistent with previous findings (Çoker & van der Linden, 2022; Lentz et al., 2018; Marcus et al., 2022; Rees et al., 2018; Wolstenholme et al., 2021), attitudes had the greatest impact, revealing that addressing attitudes toward reducing red and processed meat consumption is the most promising avenue for increasing intention to reduce meat consumption.

The primary contribution of our research lies in highlighting the central role of personal norms as a full mediator in the relationship between social norms, perceived behavioral control, and attitudes toward intention to reduce red and processed meat consumption. These results partially confirm the findings of Severijns et al. (2023), who posited that social contacts, understood as personal norms, are a promising pathway for reducing animal protein consumption. In contrast to findings from the Netherlands (Severijns et al., 2023), our results support the hypothesis that social norms - specifically, the perception of how socially acceptable a behavior is - positively influence personal norms. This suggests that in both Italy and France, excessive consumers of red and processed meat who perceive social pressure to reduce their consumption are more likely to develop personal norms

[4] As specified in Savalei et al. (2024): "$RMSEA_D$ is interpreted in the same way as the overall model RMSEA." Thus, a high $RMSEA_D$ value indicates a significant increase in misfit caused by the constraints imposed in the more complex model (*i.e.*, the model with more df).

supporting that behavior. These findings align with those of recent research (Hielkema & Lund, 2021; Sharps et al., 2021), indicating that family and friends play significant roles in motivating individuals to decrease red and processed meat consumption. Therefore, campaigns that target social environments are expected to be highly effective.

Our results also highlight that perceived behavioral control, which refers to one's perception of their ability to change behavior, is a significant factor that can be leveraged to positively influence consumers' attitudes towards reducing red and processed meat consumption by enhancing their personal norms. This means that when excessive eaters are confident in their ability to reduce red and processed meat consumption, they are more likely to develop personal norms that support this decision (Seffen & Dohle, 2023). Therefore, campaigns aimed at communicating the wide availability of quick and easy plant-based options for preparing meatless dishes, along with increasing access to substitute products, could be pivotal in enhancing perceived behavioral control. This, in turn, may create opportunities to reduce red and processed meat consumption (Seffen & Dohle, 2023). Regarding sociodemographic variables, control variables such as gender and age did not show significant effects in our theoretical model, indicating that they do not differentially impact intention to reduce red and processed meat consumption. This contrast with findings from Çoker and van der Linden (2022) and the green consumer profile outlined by Diamantopoulos et al. (2003). By contrast, income and education had significant effects. One plausible explanation could be that wealthier and more educated consumers rely more on their perceived knowledge of the potential risks of excessive red and processed meat consumption, thereby exercising greater control over their consumption habits. However, these results should be interpreted with caution because of the convenience sampling method employed.

Our findings also demonstrate that considering attributes such as healthfulness, sustainability, and convenience (both in buying and preparing) in daily food choices positively affects intentions to reduce meat consumption. These results further validate and expand upon the findings of Wang and Scrimgeour (2021), who observed the influence of environmental concerns on willingness to adopt a more plant-based diet in China and New Zealand. Therefore, raising consumer awareness of these factors may effectively decrease meat consumption among individuals who consume meat excessively. Public campaigns and behavioral incentives can further support this shift by emphasizing the associated negative health effects of excessive meat consumption (Caso et al., 2023) and employing heuristic strategies (Wassmann et al., 2023).

Finally, our research identified a common behavioral model explaining intentions to reduce red and processed meat consumption in Western countries. This suggests that implementing cross-country campaigns could streamline marketing efforts and potentially reduce the costs associated with tailoring solutions to specific countries.

In summary, our results highlight the need for integrated interventions that simultaneously consider intentions, attitudes, social norms, perceived control, and food choice motives to effectively promote sustainable dietary change among excessive meat consumers.

6. Limitations and future research

This study has several key limitations. First, it relied on convenience samples from Italy and France. Consequently, the generalizability of our findings and interpretations may be constrained, warranting replication with nationally representative samples to discern geographical variation. Additionally, by examining the behavioral intentions of consumers in two European countries, Italy and France, both traditionally adhering to the Mediterranean dietary pattern, this study provides a partial perspective on cross-country similarities and differences in the behavioral model underlying the intention to reduce red and processed meat consumption. Future research could investigate whether the observed model invariance persists in countries with different dietary habits and cultural contexts.

Moreover, the use of self-reported measures for intention and behavior may have introduced social desirability bias. Future investigations could employ objective measures, such as purchasing data or field experiments, to capture actual red and processed meat consumption frequencies, thereby offering insights into authentic behaviors and the influence of situational factors. Finally, our study does not exclude the potential influence of undisclosed factors, such as personal beliefs and psychographic characteristics, on the reduction in red and processed meat consumption. Future interdisciplinary research should explore these aspects comprehensively, aiming to uncover additional individual and context-specific factors while investigating the potential interconnections among them. This approach will enhance our understanding of consumer behaviors related to meat consumption and provide valuable insights for designing more effective, behavior-focused interventions.

CRediT authorship contribution statement

Gerarda Caso: Writing – original draft, Investigation, Data curation, Conceptualization. **Laura Trinchera:** Writing – original draft, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Rosaria Romano:** Writing – original draft, Supervision, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Riccardo Vecchio:** Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Ethical statement

This study was conducted following the ethical standards of the relevant institutional and national research committees and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

The authors affirm that the research involving human participants was performed in compliance with ethical guidelines and that the privacy rights of participants were observed.

Acknowledgements and funding

The data collection for this study has been supported by NEOMA Business School's Grant 414606. L. Trinchera is grateful to the support of the Developing Sustainable Practices group of the AE The World We Want and of the Chair in Bioeconomy and Sustainable Development at NEOMA Business School. The views, opinions and conclusions expressed in this paper solely reflect those of the authors.

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. Appendix

Table A1
Item descriptions

Items
(SN1) Most people who are important to me think that I should reduce red/processed meat consumption.
(SN2) People who are important to me would approve my reduction of red/processed meat consumption.
(SN3) People who are important to me want me to reduce red/processed meat consumption.
(PBC1) It is entirely up to me if I reduce my weekly red/processed meat consumption.
(PBC2) I believe I have enough opportunities to reduce my consumption of red/processed meat.
(PBC3) I feel able to reduce my consumption of red/processed meat.
(PN1) I would feel guilty if I would not reduce my red/processed meat consumption.
(PN2) I feel morally obliged to reduce red/processed meat consumption.
(PN3) Having an excessive red/processed meat consumption is against my moral principles.
(ATT1) I think reducing consumption of red/processed meat is a sustainable choice.
(ATT2) I think that reducing consumption of red/processed meat is environmentally friendly.
(ATT3) I think that reducing consumption of red/processed meat have digestive benefits.
(ATT4) I think that reducing consumption of red/processed meat are beneficial for my health.
(ATT5) I think reducing consumption of red/processed meat is better for animal welfare.
(ATT 6) Reducing consumption of red/processed meat makes me feel good.
(INT1) I intend to reduce my weekly red/processed meat consumption.
(INT2) I plan to reduce my weekly red/processed meat consumption.
(INT3) I will reduce my weekly red/processed meat consumption.
(BEH1) I have been reducing my consumption of red/processed meat gradually.
(BEH2) I have reduced my consumption of red/processed meat over the past four weeks.
(BEH3) I have reduced my consumption of red/processed meat when I eat out of home.
It is important to me that the food I eat on a typical day…
(FCM1) is healthy
(FCM2) is a way of monitoring my mood (*e.g.*, a good feeling or coping with stress)
(FCM3) is convenient (in buying and preparing)
(FCM4) provides me with pleasurable sensations (*e.g.*, texture, smell and taste)
(FCM5) is natural
(FCM6) is affordable
(FCM7) helps me control my weight
(FCM8) is familiar
(FCM9) is environmentally friendly
(FCM10) is animal friendly
(FCM11) is fairly traded

Table A2
Factor loadings ($N = 1037$).

LV	MV	Estimate	SE	t-values	p-values	ci.lower	ci.upper
ATT	ATT1	1					
	ATT2	0.987	0.029	34.347	<0.001	0.930	1.043
	ATT3	0.921	0.036	25.442	<0.001	0.850	0.992
	ATT4	0.917	0.038	24.394	<0.001	0.843	0.991
	ATT5	0.847	0.035	24.393	<0.001	0.779	0.915
	ATT6	0.915	0.040	22.87	<0.001	0.836	0.993
SN	SN1	0.983	0.035	27.911	<0.001	0.914	1.052
	SN2	0.814	0.036	22.748	<0.001	0.744	0.884
	SN3	1					
INT	INT1	0.988	0.021	46.659	<0.001	0.946	1.029
	INT2	1					
	INT3	0.974	0.019	50.352	<0.001	0.936	1.012
BEH	BEH1	0.974	0.024	39.967	<0.001	0.927	1.022
	BEH2	1					
	BEH3	0.914	0.027	33.705	<0.001	0.861	0.968
PBC	PBC1	0.783	0.059	13.182	<0.001	0.667	0.900
	PBC2	1					
	PBC3	0.921	0.052	17.586	<0.001	0.818	1.024
PN	PN1	1					
	PN2	0.968	0.034	28.630	<0.001	0.901	1.034
	PN3	0.917	0.042	21.936	<0.001	0.835	0.999
FCM	FCM1	0.999	0.049	20.244	<0.001	0.903	1.096
	FCM2	0.795	0.046	17.139	<0.001	0.704	0.886
	FCM3	0.773	0.045	16.996	<0.001	0.684	0.862
	FCM4	0.740	0.046	16.020	<0.001	0.649	0.830
	FCM5	0.893	0.040	22.509	<0.001	0.816	0.971
	FCM6	0.734	0.044	16.511	<0.001	0.647	0.821
	FCM7	0.807	0.045	18.030	<0.001	0.720	0.895
	FCM8	0.691	0.043	15.995	<0.001	0.606	0.776
	FCM9	1					
	FCM10	0.970	0.039	24.803	<0.001	0.894	1.047
	FCM11	0.903	0.039	22.892	<0.001	0.826	0.980

Table A3
Path coefficients estimates before and after adjusting for Common Method Bias ($N = 1037$).

Hypothesis	Path	Original estimates	CMB adjusted estimates
H1	INT ➔ BEH	0.772***	0.772***
H2	ATT ➔ INT	0.725***	0.725***
H3	FCM ➔ INT	0.113***	0.113***
H4a	SN ➔ PN	0.703***	0.703***
H4b	PBC ➔ PN	0.166***	0.166***
H4c	PN ➔ ATT	0.753***	0.753***
H4d	Indirect effect of SN on ATT via PN	0.529***	0.529***
	Indirect effect of PBC on ATT via PN	0.125***	0.125***
Control Variables	AGE	−0.002	−0.002
	EDU_HighSchool	0.038	0.038
	EDU_Bachelor	0.024	0.024
	EDU_Master	0.085*	0.085*
	EDU_PostMaster	0.037	0.037
	INC_Low	−0.035	−0.035
	INC_Average	−0.090*	−0.090*
	INC_High	−0.090**	−0.090**
	Gender_W	−0.026	−0.026

Notes: *p<0.05; **p<0.01; ***p <0.001.

Table A4
Tests for measurement invariance between France and Italy samples.

Model	SB χ^2	df	Robust CFI	Robust RMSEA	Model Comparison	$\Delta\chi^2$	*p-value*	$RMSEA_D$	Decision
Model 1	1585.03	886	0.889	0.065	–	–	–	–	
Model 2	1614.61	911	0.888	0.064	2 vs. 1	11.56	0.990	0.011	Metric invariance supported
Model3	1674.07	936	0.884	0.065	3 vs 2	47.56	0.004	0.054	Scalar invariance supported
Model 4	1762.29	968	0.872	0.067	4 vs 3	57.50	0.004	0.083	Residual invariance rejected

Note: Model 1, CFA model for configural invariance – no constrains; Model 2, CFA model for metric (weak) invariance – same loadings; Model 3, CFA model for scalar (strong) invariance – same loadings and intercepts; Model 4, CFA model for residuals (strict) invariance – same loading, intercepts and residual variances.

Table A5
Standardized path coefficients comparison between France and Italy, estimates obtained under scalar measurement invariance.

Hypothesis	Path	France ($n = 513$)	Italy ($n = 524$)
H1	INT ➔ BEH	0.729***	0.813***
H2	ATT ➔ INT	0.695***	0.762***
H3	FCM ➔ INT	0.135***	0.083***
H4a	SN ➔ PN	0.747***	0.631***
H4b	PBC ➔ PN	0.163*	0.260***
H4c	PN ➔ ATT	0.727***	0.787***
	Indirect effect of SN on ATT via PN	0.543***	0.496***
	Indirect effect of PBC on ATT via PN	0.118*	0.205***
	AGE	−0.013	0.016
	EDU_HighSchool	0.160*	−0.074
	EDU_Bachelor	0.096	−0.022
	EDU_Master	0.176**	−0.002
Control Variables	EDU_PostMaster	0.143*	−0.063
	INC_Low	−0.105	0.035
	INC_Average	−0.168**	−0.006
	INC_High	−0.166**	−0.015
	Gender_W	−0.050	−0.006

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

Data availability

The data supporting the findings of this study are openly available and can be accessed.

References

Ahmad, W., Kim, W. G., Anwer, Z., & Zhuang, W. (2020). Schwartz personal values, theory of planned behavior and environmental consciousness: How tourists' visiting intentions towards eco-friendly destinations are shaped? *Journal of Business Research, 110*, 228–236.

Aiking, H., & de Boer, J. (2020). The next protein transition. *Trends in Food Science & Technology, 105*, 515–522.

Aitken, R., Watkins, L., Williams, J., & Kean, A. (2020). The positive role of labelling on consumers' perceived behavioural control and intention to purchase organic food. *Journal of Cleaner Production, 255*, Article 120334.

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

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior 1. *Journal of Applied Social, psychology,32(4)*, 665–683.

Al-Swidi, A., Huque, M. R., & S., Haroon Hafeez, M., & Noor Mohd Shariff, M.. (2014). The role of subjective norms in theory of planned behavior in the context of organic food consumption. *British Food Journal, 116*(10), 1561–1580.

Alzubaidi, H., Slade, E. L., & Dwivedi, Y. K. (2021). Examining antecedents of consumers' pro-environmental behaviours: TPB extended with materialism and innovativeness. *Journal of Business Research, 122*, 685–699.
Amiot, C. E., El Hajj Boutros, G., Sukhanova, K., & Karelis, A. D. (2018). Testing a novel multicomponent intervention to reduce meat consumption in young men. *PLoS ONE, 13*(10), Article 0204590.
Aschemann-Witzel, J., & Janssen, M. (2022). The role of policy actions to accelerate food consumer behaviour change. *Agricultural and Food Economics, 10*(1), 1–3.
Asparouhov, T., & Muthén, B. (2010). Weighted least squares estimation with missing data. *Mplus Technical Appendix, 2010*(1-10), 5.
Bamberg, S., Hunecke, M., & Blöbaum, A. (2007). Social context, personal norms and the use of public transportation: Two field studies. *Journal of Environmental Psychology, 27*(3), 190–203.
Bollen, K. A. (2014). *Structural equations with latent variables*. John Wiley & Sons.
Bonnet, C., Bouamra-Mechemache, Z., & Corre, T. (2018). An environmental tax towards more sustainable food: empirical evidence of the consumption of animal products in France. *Ecological Economics, 147*, 48–61.
Bonnet, C., Bouamra-Mechemache, Z., Réquillart, V., & Treich, N. (2020). Regulating meat consumption to improve health, the environment and animal welfare. *Food Policy, 97*, Article 101847.
Borusiak, B., Szymkowiak, A., Kucharska, B., Gálová, J., & Mravcová, A. (2022). Predictors of intention to reduce meat consumption due to environmental reasons–Results from Poland and Slovakia. *Meat Science, 184*, Article 108674.
Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods & Research, 21*(2), 230–258.
Byun, J., & Jang, S. (2019). Can signaling impact customer satisfaction and behavioral intentions in times of service failure? Evidence from open versus closed kitchen restaurants. *Journal of Hospitality Marketing & Management, 28*(7), 785–806.
Carfora, V., Caso, D., & Conner, M. (2017). Correlational study and randomised controlled trial for understanding and changing red meat consumption: The role of eating identities. *Social Science & Medicine, 175*, 244–252.
Carfora, V., Conner, M., Caso, D., & Catellani, P. (2020). Rational and moral motives to reduce red and processed meat consumption. *Journal of Applied Social Psychology, 50*(12), 744–755.
Caso, G., Rizzo, G., Migliore, G., & Vecchio, R. (2023). Loss framing effect on reducing excessive red and processed meat consumption: Evidence from Italy. *Meat Science, 199*, Article 109135.
Castellini, G., & Graffigna, G. (2024). The moderating role of food involvement: an application of the theory of planned behaviour model in reducing red meat consumption. *Food Quality and Preference, 120*, Article 105255.
Clark, M. A., Springmann, M., Hill, J., & Tilman, D. (2019). Multiple health and environmental impacts of foods. *Proceedings of the National Academy of Sciences, 116*(46), 23357–23362.
Çoker, E. N., & van der Linden, S. (2022). Fleshing out the theory of planned of behavior: Meat consumption as an environmentally significant behavior. *Current Psychology, 41*(2), 681–690.
Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*(15), 1429–1464.
Costa, M. P., Saget, S., Zimmermann, B., Petig, E., Angenendt, E., Rees, R. M., & Styles, D. (2023). Environmental and land use consequences of replacing milk and beef with plant-based alternatives. *Journal of Cleaner Production, 424*, Article 138826.
Diamantopoulos, A., Schlegelmilch, B. B., Sinkovics, R. R., & Bohlen, G. M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research, 56*(6), 465–480.
Dorce, L. C., da Silva, M. C., Mauad, J. R. C., de Faria Domingues, C. H., & Borges, J. A. R. (2021). Extending the theory of planned behavior to understand consumer purchase behavior for organic vegetables in Brazil: The role of perceived health benefits, perceived sustainability benefits and perceived price. *Food Quality and Preference, 91*, Article 104191.
Dussiot, A., Fouillet, H., Perraud, E., Salomé, M., Huneau, J. F., Mariotti, F., & Kesse-Guyot, E. (2023). How to best reshape diets to be healthier with lower or no ruminant meat, and implications for environmental pressures. *Journal of Cleaner Production, 137600*.
EU (2021). Delivering the European Green Deal. Available at: (last access 05/01/2023).
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.
Fornara, F., Pattitoni, P., Mura, M., & Strazzera, E. (2016). Predicting intention to improve household energy efficiency: The role of value-belief-norm theory, normative and informational influence, and specific attitude. *Journal of Environmental Psychology, 45*, 1–10.
de Gavelle, E., Davidenko, O., Fouillet, H., Delarue, J., Darcel, N., Huneau, J. F., & Mariotti, F. (2019). Self-declared attitudes and beliefs regarding protein sources are a good prediction of the degree of transition to a low-meat diet in France. *Appetite, 142*, Article 104345.
Gidaković, P., Zabkar, V., Zečević, M., Sagan, A., Wojnarowska, M., Sołtysik, M., & Cleff, T. (2024). Trying to buy more sustainable products: Intentions of young consumers. *Journal of Cleaner Production, 434*, Article 140200.
Graça, J., Calheiros, M. M., & Oliveira, A. (2015). Attached to meat? (Un) Willingness and intentions to adopt a more plant-based diet. *Appetite, 95*, 113–125.
Graça, J., Godinho, C. A., & Truninger, M. (2019). Reducing meat consumption and following plant-based diets: Current evidence and future directions to inform integrated transitions. *Trends in Food Science & Technology, 91*, 380–390.
Graça, J., Truninger, M., Junqueira, L., & Schmidt, L. (2019). Consumption orientations may support (or hinder) transitions to more plant-based diets. *Appetite, 140*, 19–26.
Han, H., Hwang, J., Lee, M. J., & Kim, J. (2019). Word-of-mouth, buying, and sacrifice intentions for eco-cruises: Exploring the function of norm activation and value-attitude-behavior. *Tourism Management, 70*, 430–443.
Harguess, J. M., Crespo, N. C., & Hong, M. Y. (2020). Strategies to reduce meat consumption: A systematic literature review of experimental studies. *Appetite, 144*, Article 104478.
Hartmann, C., & Siegrist, M. (2020). Our daily meat: Justification, moral evaluation and willingness to substitute. *Food Quality and Preference, 80*, Article 103799.
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.
Herrero, M., Havlík, P., Valin, H., Notenbaert, A., Rufino, M. C., Thornton, P. K., & al.. (2013). Biomass use, production, feed efficiencies, and greenhouse gas emissions from global livestock systems. *Proceedings of the National Academy of Sciences, 110*(52), 20888–20893.
Hielkema, M. H., & Lund, T. B. (2021). Reducing meat consumption in meat-loving Denmark: Exploring willingness, behavior, barriers and drivers. *Food Quality and Preference, 93*, Article 104257.
Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55.
IPPC (2022). Special Report on Climate Change and Land. Available at: https://www.ipcc.ch/srccl/ (last access 05/01/2023).
Jaeger, S. R., & Cardello, A. V. (2022). Factors affecting data quality of online questionnaires: Issues and metrics for sensory and consumer research. *Food Quality and Preference, 102*, Article 104676.
Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Scientific Software International.
Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., & Rosseel, Y. (2022). semTools: Useful tools for structural equation modeling. R package version 0.5-6. Retrieved from https://CRAN.R-project.org/package = semTools.
Kaiser, F. G. (2006). A moral extension of the theory of planned behavior: Norms and anticipated feelings of regret in conservationism. *Personality and Individual Differences, 41*(1), 71–81.
Kim, J. J., & Hwang, J. (2020). Merging the norm activation model and the theory of planned behavior in the context of drone food delivery services: Does the level of product knowledge really matter? *Journal of Hospitality and Tourism Management, 42*, 1–11.
Kline, R. B. (2010). Promise and pitfalls of structural equation modeling in gifted research. In B. Thompson, & R. F. Subotnik (Eds.), *Methodologies for conducting research on giftedness* (pp. 147–169). American Psychological Association.
Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.
Klink, U., Mata, J., Frank, R., & Schüz, B. (2022). Socioeconomic differences in animal food consumption: Education rather than income makes a difference. *Frontiers in Nutrition, 9*, Article 993379.
Lentz, G., Connelly, S., Mirosa, M., & Jowett, T. (2018). Gauging attitudes and behaviours: Meat consumption and potential reduction. *Appetite, 127*, 230–241.
Leonidou, L. C., Eteokleous, P. P., Christofi, A. M., & Korfiatis, N. (2022). Drivers, outcomes, and moderators of consumer intention to buy organic goods: Meta-analysis, implications, and future agenda. *Journal of Business Research, 151*, 339–354.
Lindell, M. K., & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology, 86*(1), 114–121.
MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*(2), 130.
Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common Method Variance in IS Research: A Comparison of Alternative Approaches and a Reanalysis of Past Research. *Management Science, 52*(12), 1865–1883.
Marcus, N., Klink-Lehmann, J., & Hartmann, M. (2022). Exploring factors determining German consumers' intention to eat meat alternatives. *Food Quality and Preference, 100*, Article 104610.
Maydeu-Olivares, A. (2017). Maximum likelihood estimation of structural equation models for continuous data: Standard errors and goodness of fit. *Structural Equation Modeling: A Multidisciplinary Journal, 24*(3), 383–394.
Michaelidou, N., & Hassan, L. M. (2010). Modeling the factors affecting rural consumers' purchase of organic and free-range produce: A case study of consumers' from the Island of Arran in Scotland, UK. *Food Policy, 35*(2), 130–139.
Minton, E. A., Spielmann, N., Kahle, L. R., & Kim, C. H. (2018). The subjective norms of sustainable consumption: A cross-cultural exploration. *Journal of Business Research, 82*, 400–408.
Mullee, A., Vermeire, L., Vanaelst, B., Mullie, P., Deriemaeker, P., Leenaert, T., & Huybrechts, I. (2017). Vegetarianism and meat consumption: A comparison of attitudes and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium. *Appetite, 114*, 299–305.
Nascimento, J., & Loureiro, S. M. C. (2024). Understanding the desire for green consumption: Norms, emotions, and attitudes. *Journal of Business Research, 178*, Article 114675.
Odou, P., & Schill, M. (2020). How anticipated emotions shape behavioral intentions to fight climate change. *Journal of Business Research, 121*, 243–253.
Onwezen, M. C., Antonides, G., & Bartels, J. (2013). The Norm Activation Model: An exploration of the functions of anticipated pride and guilt in pro-environmental behaviour. *Journal of Economic Psychology, 39*, 141–153.

Onwezen, M. C., Reinders, M. J., Verain, M. C. D., & Snoek, H. M. (2019). The development of a single-item Food Choice Questionnaire. *Food Quality and Preference, 71*, 34–45.
Onwezen, M. C., Verain, M. C., & Dagevos, H. (2022). Positive emotions explain increased intention to consume five types of alternative proteins. *Food Quality and Preference, 96*, Article 104446.
Pandey, S., Ritz, C., & Perez-Cueto, F. J. A. (2021). An Application of the Theory of Planned Behaviour to Predict Intention to Consume Plant-Based Yogurt Alternatives. *Foods, 10*(1), 148.
Park, H. J., & Lin, L. M. (2020). Exploring attitude–behavior gap in sustainable consumption: Comparison of recycled and upcycled fashion products. *Journal of Business Research, 117*, 623–628.
Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Razionalizzare il consumo di carne. Le 4N. *Appetite, 91*, 114–128.
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879.
Podsakoff, P. M., & Organ, D. W. (1986). Self-Reports in Organizational Research: Problems and Prospects. *Journal of Management, 12*(4), 531–544.
Punzo, G., Panarello, D., Pagliuca, M. M., Castellano, R., & Aprile, M. C. (2019). Assessing the role of perceived values and felt responsibility on pro-environmental behaviours: A comparison across four EU countries. *Environmental Science & Policy, 101*, 311–322.
Randall, T., Cousins, A. L., Neilson, L., Price, M., Hardman, C. A., & Wilkinson, L. L. (2024). Sustainable food consumption across Western and Non-Western cultures: A scoping review considering the theory of planned behaviour. *Food Quality and Preference, 105086*.
Randers, L., & Thøgersen, J. (2023). Meat, myself, and I: The role of multiple identities in meat consumption. *Appetite, 180*, Article 106319.
Rees, J. H., Bamberg, S., Jäger, A., Victor, L., Bergmeyer, M., & Friese, M. (2018). Breaking the habit: on the highly habitualized nature of meat consumption and implementation intentions as one effective way of reducing it. *Basic and Applied Social Psychology, 40*(3), 136–147.
Romanello, M., Di Napoli, C., Drummond, P. G. C., Kennard, H., Lampard, P., & al.. (2022). The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels. *Lancet, 400*, 1619–1654.
Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*, 1–36.
Ruzgys, S., & Pickering, G. J. (2024). Gen Z and sustainable diets: Application of The Transtheoretical Model and the theory of planned behaviour. *Journal of Cleaner Production, 434*, Article 140300.
Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika, 66*(4), 507–514.
Savalei, V., Brace, J. C., & Fouladi, R. T. (2024). We need to change how we compute RMSEA for nested model comparisons in structural equation modeling. *Psychological Methods, 29*(3), 480–493. https://doi.org/10.1037/met0000537
Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodnessof-Fit Measures. *Methods of Psychological Research Online, 8*(2), 23–74.
Seffen, A. E., & Dohle, S. (2023). What motivates German consumers to reduce their meat consumption? Identifying relevant beliefs. *Appetite, 187*, Article 106593.
Severijns, R., Streukens, S., Brouwer, J., & Lizin, S. (2023). Social influence and reduction of animal protein consumption among young adults: Insights from a socio-psychological model. *Journal of Environmental Psychology, 90*, Article 102094.
Sharps, M. A., Fallon, V., Ryan, S., & Coulthard, H. (2021). The role of perceived descriptive and injunctive norms on the self-reported frequency of meat and plant-based meal intake in UK-based adults. *Appetite, 167*, Article 105615.
Shin, Y. H., Im, J., Jung, S. E., & Severt, K. (2018). The theory of planned behavior and the norm activation model approach to consumer behavior regarding organic menus. *International Journal of Hospitality Management, 69*, 21–29.
Smith, A. M. (2008). Control, responsibility, and moral assessment. *Philosophical Studies, 138*, 367–392.
Springmann, M., Godfray, H. C. J., Rayner, M., & Scarborough, P. (2016). Analysis and valuation of the health and climate change cobenefits of dietary change. *Proceedings of the National Academy of Sciences, 113*(15), 4146–4151.
Stefan, V., van Herpen, E., Tudoran, A. A., & Lähteenmäki, L. (2013). Avoiding food waste by Romanian consumers: The importance of planning and shopping routines. *Food Quality and Preference, 28*(1), 375–381.
Stoll-Kleemann, S., & Schmidt, U. J. (2017). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change, 17*, 1261–1277.
Thangavelu, K. P., Hyland, J. J., Henchion, M., Kerry, J. P., & Álvarez, C. (2022). Consumer intention towards the phosphate-reduced processed meat products using the extended theory of planned behaviour. *Meat Science, 193*, Article 108947.
Thompson, A. W., Reimer, A., & Prokopy, L. S. (2015). Farmers' views of the environment: the influence of competing attitude frames on landscape conservation efforts. *Agriculture and Human Values, 32*, 385–399.
Trinchera, L., Marie, N., & Marcoulides, G. A. (2018). A distribution free interval estimate for coefficient alpha. *Structural Equation Modeling: A Multidisciplinary Journal, 25*(6), 876–887.
Trizano-Hermosilla, I., & Alvarado, J. M. (2016). Best alternatives to Cronbach's alpha reliability in realistic conditions: Congeneric and asymmetrical measurements. *Frontiers in Psychology, 7*, 769.
Vainio, A. (2019). How consumers of meat-based and plant-based diets attend to scientific and commercial information sources: Eating motives, the need for cognition and ability to evaluate information. *Appetite, 138*, 72–79.
Van Loo, E. J., Hoefkens, C., & Verbeke, W. (2017). Healthy, sustainable and plant-based eating: Perceived (mis) match and involvement-based consumer segments as targets for future policy. *Food Policy, 69*, 46–57.
Visschers, V. H., Wickli, N., & Siegrist, M. (2016). Sorting out food waste behaviour: A survey on the motivators and barriers of self-reported amounts of food waste in households. *Journal of Environmental Psychology, 45*, 66–78.
Wan, C., Cheung, R., & Shen, G. Q. (2012). Recycling attitude and behaviour in university campus: a case study in Hong Kong. *Facilities, 30*(13/14), 630–646.
Wang, O., & Scrimgeour, F. (2021). Willingness to adopt a more plant-based diet in China and New Zealand: Applying the theories of planned behaviour, meat attachment and food choice motives. *Food Quality and Preference, 93*, Article 104294.
Wassmann, B., Siegrist, M., & Hartmann, C. (2023). The role of heuristics for composing an environmentally friendly meal. *Journal of Cleaner Production, 402*, Article 136818.
Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., & Murray, C. J. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet, 393*(10170), 447–492.
Wolstenholme, E., Carfora, V., Catellani, P., Poortinga, W., & Whitmarsh, L. (2021). Explaining intention to reduce red and processed meat in the UK and Italy using the theory of planned behaviour, meat-eater identity, and the Transtheoretical model. *Appetite, 166*, Article 105467.
Yu, Z., Jiang, S., Cheshmehzangi, A., Liu, Y., & Deng, X. (2023). Agricultural restructuring for reducing carbon emissions from residents' dietary consumption in China. *Journal of Cleaner Production, 387*, Article 135948.
Zaremohzzabieh, Z., Ismail, N., Ahrari, S., & Samah, A. A. (2021). The effects of consumer attitude on green purchase intention: A meta-analytic path analysis. *Journal of Business Research, 132*, 732–743.
Zhang, X., Zhou, L., & Savalei, V. (2022). Comparing the Psychometric Properties of a Scale Across Three Likert and Three Alternative Formats: An Application to the Rosenberg Self-Esteem Scale. *Educational and Psychological Measurement, 83*(4), 649–683.
Zhu, W., Zhang, Q., & Wang, F. (2024). Factors affecting the consumption intention of game meats: Integrating theory of planned behavior and norm activation model. *Biological Conservation, 292*, Article 110544.