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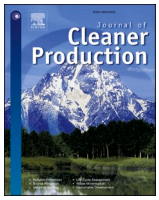

Consumer perception of and involvement in healthy and sustainable eating: A cross-sectional study with American consumers

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ABSTRACT

Global rising concerns about non-communicable diseases and the environmental impact of food production require a call for action that involves a deeper understanding of how individuals make choices for healthy and sustainable diets. To further explore this topic, our study aimed at investigating how food involvement, perception, and sociodemographic factors influence the adoption of healthy and sustainable eating by using a socio-psychological model. Data were collected from a representative sample (n = 1001) of the US population using an online survey and linear regression models were employed to test the hypotheses of our theoretical framework. The main findings indicated a positive influence of involvement in and perception of self-reported behaviors towards both sustainable and healthy eating. However, contrasting results were identified for the moderating role of perception, which had a significant and positive moderating effect between involvement and self-reported eating for sustainable diets only. Regarding sociodemographic characteristics affecting healthy dietary behaviors, our model suggested that age, employment status, dietary regimen, and BMI influence consumers' self-reported healthy behaviors. Based on our findings, tailored strategies for policymakers and marketers are suggested. These strategies include education campaigns, widespread availability of sustainable products, and easily identifiable labeling systems.

1. Introduction

It is well established that our dietary choices have an impact on both the environment and our health status (Donati et al., 2016). Currently, each year an estimated 41 million people die due to non-communicable diseases (NCDs), which is equivalent to 71 % of all deaths globally (WHO, 2018). NDCs are represented by cardiovascular diseases (e.g., heart attacks and stroke), cancers, chronic respiratory diseases, and diabetes. Increasing evidence shows that unhealthy eating habits, such as the consumption of larger amounts of processed foods that are high in calories, and a lack of physical activity throughout the life course may increase the risks for NCDs (WHO, 2018, 2020). The consumption of foods high in energy, fats, free sugars, and salt/sodium is among the most common unhealthy dietary practices (WHO, 2020). Therefore, the World Health Organization (WHO) of the United Nations and other national health authorities have called for the development of strategies to reduce the risk of NDCs through the promotion of a balanced diet and to minimize food-related risk factors such as overweight and obesity (WHO, 2018). According to the EAT-Lancet Commission (Willett et al., 2019), a universal healthy reference diet can be defined as a plant-based diet mainly composed of fruits and vegetables, whole grains, pulses, nuts, and unsaturated fatty acids. In addition, a healthy diet should include low quantities of fish products and white meat, and no or a low amount of red meat, processed meat, added sugar, refined grains, and starchy vegetables.

However, the food system and our food choices do not impact only human health, but also the planet. Given the increasing concerns about food sustainability, research on sustainability and consumers' food behavior has increased over the last decades (Aschemann-Witzel, 2015; Buratto and Lotti, 2024; Yadav and Pathak, 2017), with steady growth since 2015, when world leaders pledged to achieve the seventeen UN Sustainable Development Goals (SDGs) by 2030 (United Nations, 2023). To explain the concept of sustainable diets, the Food and Agriculture Organization (FAO) and the WHO defined these diets as those having "low environmental impacts that contribute to food and nutrition security" (FAO and WHO, 2019). Sustainable diets should also be

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considered culturally acceptable, accessible, and affordable, and should be able to optimize natural and human resources (FAO and WHO, 2019; Gabriel et al., 2018). Other essential pillars are access to safe and clean water, minimizing the use of antibiotics and hormones, reducing the use of plastics in food packaging, respecting local cultures, and minimizing food loss and waste (FAO and WHO, 2019). Emphasizing the importance of consumer choices, behaviors such as reducing meat consumption and choosing locally sourced or organically produced products can contribute to enhancing the sustainability of our diets (Font-i-Furnols, 2023; Niggli, 2015; Scalvedi and Saba, 2018; Stein and Santini, 2022).

To maximize the impact of our diets, it is critical to understand whether healthy dietary patterns can also be considered sustainable. To explore this topic, recent studies have investigated both nutritional aspects, such as nutrient adequate intake, and environmental indicators, such as CO_2 emissions and water usage, of different diets. Although the composition of healthy and sustainable eating varies according to the cultural context, healthy diets can also be considered sustainable when these emphasize an abundance of plant-based foods (e.g., wholegrains, pulses, vegetables, fruits), favor unprocessed (or minimally processed) products, and limit foods of animal origin (i.e., eggs, dairy, meat, and fish) (FAO and WHO, 2019; Muñoz-Martínez et al., 2023). Focusing on the health and environmental impacts of specific dietary patterns, previous studies on different global regions have shown that, despite some country-specific variability, diets lowering the intake of foods of animal origin – and not necessarily eliminating them – and favoring fruit, vegetables, legumes, and cereals, according to nutritional guidelines, could be beneficial for both human health and the planet (Blackstone et al., 2018; Rosi et al., 2017; Springmann et al., 2016).

One of the crucial challenges in developing policy interventions and communication strategies to encourage the adoption of a healthy and sustainable diet is to comprehend the potential barriers (e.g., the effort required to prepare vegetable dishes) and drivers (e.g., perception of healthy food as appealing) from a consumer perspective (De Marchi, Scappaticci, Banterle and Alamprese, 2024; Guthrie et al., 2015; Ju et al., 2024; Lehner et al., 2016; Van Loo et al., 2017). However, food choices are a complex process that incorporates personal factors, such as how people perceive and interact with food and sociodemographic characteristics, such as gender, age, education, and Body Max Index (BMI) (Chrysochou et al., 2010). As a consequence, it is critical to further understand how to promote healthy and sustainable eating habits among consumers (Aschemann-Witzel, 2015). In addition, a previous study by Springmann et al. (2016) highlighted that the impact of dietary changes, such as reducing the consumption of animal-based products, varies greatly across regions as it is influenced by variations in dietary patterns, socioeconomic conditions, and cultural preferences (Springmann et al., 2016). Following their findings, Western high-income countries would experience the largest per capita health benefits from a dietary shift towards plant-based diets, with reductions in mortality rates and GHG emissions. Similarly, the authors emphasized the importance of reducing overall energy intake and increasing the consumption of fruits and vegetables to maximize health and environmental benefits. This is especially true in the US as research has shown that some consumers face significant barriers to accessing healthy foods (Laddu et al., 2024). As for other studies, it is necessary to emphasize, as also done in other parts of this paper, that much previous research focuses on the two aspects, health and sustainability, together (see for example, Bourke et al., 2024). This represents an important gap in the literature that we believe deserves to be filled, therefore referring to these two aspects separately allows us to give equal importance to the two and to prevent one from contaminating the results of the other.

In this context, and considering the high levels of overconsumption and meat consumption in the US (FAO, 2024), understanding the food-related behaviors of US consumers is crucial for designing targeted interventions to effectively promote shifts in eating habits. To contribute to the scientific evidence on this issue, this study seeks to examine how individual-level factors – specifically, involvement in and perceptions of healthy and sustainable eating, along with sociodemographic characteristics – influence dietary behaviors.

Data were collected from a representative sample of the US population using an online survey.

The results of this study could help food producers, processors, and retailers to develop marketing strategies that successfully target specific consumer needs – for instance, through food labeling schemes that could help consumers quickly identify healthy and sustainable food, and by providing them with the information they deem as important. Moreover, these findings may contribute to a better understanding of the complex interplay between diet and sociodemographic variables and could be of use to develop public healthy and sustainable customized interventions to improve dietary behaviors (Aschemann-Witzel, 2015).

1.1. Framework

Among the various theories related to behavior, each focusing on distinct aspects, the Theory of Planned Behavior (Ajzen, 1991) emphasizes attitudes and subjective norms. While subjective norms are not the focus of our study, the concept of favorable/unfavorable evaluations of behavior (as defined by Ajzen, 1991) provides a useful starting point. Moving from this theory, we explored aspects related to social cognition (Mullan, 2010), with some models – e.g., the Social Cognitive Theory (Bandura, 2001) – offering valuable insights. This theory, which is based on perceived self-efficacy, is particularly relevant as it addresses subjective factors related to the effectiveness of choices, such as those linked to healthy and sustainable diets.

The Transtheoretical Model of Change, widely used in diet-related consumer studies (Horwath, 1999; Spencer et al., 2007), also falls within the social cognition approach. While this model focuses on the stages of change, our study is more concerned with factors that influence change, rather than the steps of the process itself. Finally, the Elaboration Likelihood Model (Petty and Cacioppo, 1986) served as a useful foundation; however, we made significant modifications based on previously mentioned models, as well as considerations clarified below.

Previous studies suggest that food-related behaviors and decisions can be influenced by consumer involvement in health and sustainability (Grunert et al., 2014; Marshall and Bell, 2004), which could open new research opportunities to further understand the link between consumers and their food decisions (Marshall and Bell, 2004). For instance, the involvement level could define the strength of information search, and thus impact the food decision-making process (Marshall and Bell, 2004; Verbeke and Vackier, 2004). According to innate needs, values, and interests, involvement in healthy and sustainable eating can be defined as the individual interest in and personal relevance of issues related to health and sustainability (Pieniak et al., 2010; Zaichkowsky, 1985). In addition, as individuals' responses to advertisements are influenced by what they deem important (Zaichkowsky, 1985), understanding consumer involvement is critical to developing tailor-made communication strategies and engaging them to modify food-related behaviors (Banovic et al., 2019; Verbeke and Vackier, 2004). Therefore, the first concept of our framework is that consumers' involvement can contribute to understanding the decision-making towards food-related behaviors.

Along with consumers' involvement, how sustainable and healthy diets are perceived is a crucial factor that may influence food choices. Perception refers to consumers' evaluations of the benefits (e.g., affordability) or drawbacks (e.g., costs related to food products) of a particular dietary pattern, which can positively or negatively influence the adoption of that behavior (Donati et al., 2016; Wongprawmas et al., 2022). However, studies investigating consumer perception of healthy and sustainable diets show heterogeneous results. Among different types of food, organic products are considered a sustainable choice by many consumers (Aschemann-Witzel, 2015) and several studies focused on consumers' perceptions of this type of food. For instance, Schuldt and Hannahan (2013) found that organic products are perceived as less tasty

than conventional ones, while in the study conducted by Prada et al. (2017), organic foods were rated as healthier and tastier than conventional food. Other authors identified no differences between organic and non-organic food (Prada et al., 2017; Schuldt and Hannahan, 2013). In terms of tastiness, research has underlined how usually healthier products are perceived as less tasty or satisfying (Raghunathan et al., 2006), which could lead consumers to avoid certain foods (Guthrie et al., 2015). Nevertheless, perceived tastiness is not the only aspect that could influence consumers. In a study by Graça et al. (2019), a lack of culinary skills to prepare meat-free dishes was recognized as a barrier when trying to reduce meat consumption (Seffen and Dohle, 2023).

Food-related behaviors are determined by several, interrelating factors, which make food choices a complex process to understand (Shepherd, 2005). For instance, perception has been previously identified as a person-related factor influencing consumer involvement (Van Loo et al., 2017). Therefore, the second concept of our framework is to investigate whether the perception of a healthy/sustainable diet can strengthen (moderate) the relation between involvement (independent variable) and self-reported behavior (dependent variable) of a healthy/sustainable diet. The potential moderating effect of food perception has been previously highlighted by past research which showed that perception acts as a moderator in the relation between attitude and purchase intention (e.g., Yilmazel, 2023).

Finally, additional variables that need to be taken into account when investigating food behavior are sociodemographic characteristics. Previous studies showed that income distribution, gender, age, and education influence consumers' attitudes and dietary behaviors (Donati et al., 2016; Lea and Worsley, 2005).

Compared to the models discussed earlier, our approach emphasizes consumer involvement and its impact on behavior. Similar to prior studies (e.g., Cheung and To, 2011), our model begins with involvement and hypothesizes a potential moderating effect, ultimately examining perceived consumer behavior (referencing the self-reported behavior's related models mentioned previously).

Thus, the main assumption that sociodemographic variables and consumer involvement and perception are related to and precede the behavior that consumers engage in is proposed in the model presented in Fig. 1.

H1a. There is a direct and positive relationship between Perception of and Involvement in a Healthy Diet and Self-Reported Healthy Eating

H1b. There is a direct and positive relationship between Perception of and Involvement in a Sustainable Diet and Self-Reported Sustainable Eating

H2a. Perception of a Healthy diet is a moderator between Involvement in a Healthy Diet and Self-Reported Healthy Eating

H2b. Perception of a Sustainable diet is a moderator between Involvement in a Sustainable Diet and Self-Reported Sustainable Eating

H3a. Socio-demographic variables (i.e., age, gender, education, employment, income, diet, and BMI) influence consumers' Self-Reported Healthy Eating

H3b. Socio-demographic variables (i.e., age, gender, education, employment, income, diet, and BMI) influence consumers' Self-Reported Sustainable Eating

2. Methods

2.1. Sample characteristics

Data were collected using a cross-sectional self-administered online survey distributed via the Qualtrics LLC platform (Provo, US), with a total sample of 1001 US adults (the initial dataset was composed of 1041 observations, but 40 were deleted due to missing information, in particular height, and weight). Participants were recruited by a subcontracted professional market research agency. Eligible participants were (1) aged 18 years or older, (2) living in the United States, and (3) a primary food shopper in their household. The sample was stratified according to the US national census official statistics (United States Government, 2019) in terms of gender, age, income level, and education. However, household income and education level do not fully match the US census distribution, which might be due to the adoption of an electronic survey method. The age range of the sample population was defined as 18–over 65 years old (age mean: 39.9 years old), with 53.15 % females. Complete descriptive statistics of the national and pooled sample are provided in Table 1.

The study conforms to the Declaration of Helsinki and the ethics approval was granted by an institutional review board (Protocol ID#: 1,810,008,359). Online participants gave informed consent by ticking a respective box at the beginning of the survey.

2.2. Measures

Participants were asked to complete a self-administered structured electronic questionnaire, which was developed by reviewing previous related studies (e.g., Pieniak et al., 2010; Whitmarsh and O'Neill, 2010; Van Loo et al., 2017).

Seven items were used to assess the perceptions of a healthy and sustainable diet using 5-point semantic differential scales. The bipolar adjectives covered different factors: tastiness (no tasty - tasty), availability (unavailable - easily available), satiety level (not filling - filling), ease of preparation (difficult to prepare - easy to prepare), price (cheap - expensive), naturalness (not natural - natural), healthfulness (not nutritious - nutritious). The included items were adapted from previous studies (e.g., Steptoe et al., 1995; Van Loo et al., 2017).

A set of four items was used to assess participants' food involvement (Banovic et al., 2019; Pieniak et al., 2010; Zaichkowsky, 1985), adapted for healthy and sustainable eating as previously done by Van Loo et al. (2017): "Sustainable/Healthy eating is very important to me", "I care a lot about Sustainable/Healthy eating", "Sustainable/Healthy means a lot to me", "I am very concerned about the consequences of what I eat in terms of sustainability/healthiness". A five-point Likert scale, anchored by "strongly disagree" (1) and "strongly agree" (5), was used to assess all items.

Our two dependent variables were self-reported healthy (1) and sustainable (2) eating. The first dimension was measured using eight items on specific actions based on the World Health Organization's recommendations (World Health Organization, 2014). The second dimension included seven items on food-related environmental-friendly lifestyle behavior. In both scales, participants were asked to rate the degree to which the statement applied to them (1, Does not apply to me at all – 5, Fully applies to me). All items were adopted from the study by Van Loo et al. (2017).

Finally, the survey included questions on the socioeconomic dimensions of the respondents (i.e., gender, age groups, annual household income, employment status, education level, BMI,[1] and diet regimen).

In addition, because of the lack of knowledge and/or misconception regarding the meaning of sustainable diets (Hsu et al., 2020), a short common definition of a healthy diet and a sustainable diet was provided to participants before the beginning of the survey. The definition is here outlined:

> *"A healthy diet contains a variety of types of food, including plenty of fruit, vegetables and starchy foods such as whole meal bread and*

[1] BMI is derived from a person's weight in kilograms, divided by height (squared) in centimeters. The recommended levels are adapted from the global WHO recommendation of 18.5–24.9 as a normal BMIhttps://www.who.int/europe/news-room/fact-sheets/item/a-healthy-lifestyle—who-recommendations.

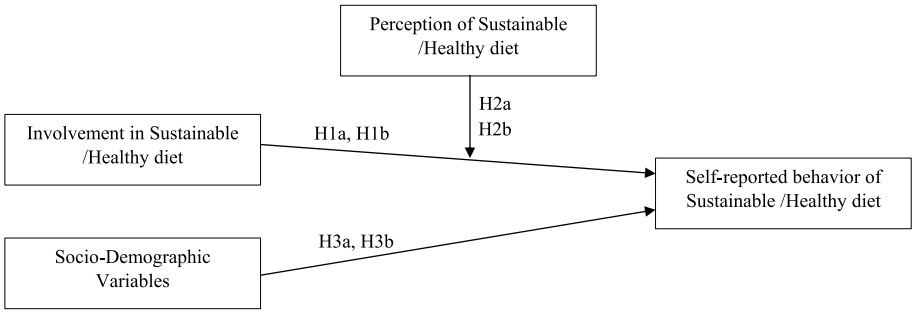

Fig. 1. The conceptual model.

Table 1
Socio-demographic variables of the sample.

	No.	%	U.S. population
Age			
18–24	99	9.89	9.1
25–34	145	14.49	13.9
35–44	199	19.88	12.6
45–54	197	19.68	12.9
55–65	159	15.88	12.9
Over 65	202	20.18	15.6
Gender			
Male	469	46.85	48.7
Female	532	53.15	51.3
Education			
Primary education (elementary school)	5	0.50	
Middle school	4	0.40	9.36
Secondary education (high school)	292	29.17	27.54
Higher education at College/University (bachelor's or equivalent level)	491	49.05	47.96
Graduate degree (master's or doctoral degree)	209	20.88	12.4
Employment			
Full-time	433	43.26	
Part-time/Other	119	11.89	
Unemployed	121	12.09	
Retired	252	25.17	
Student	35	3.50	
Other	41	4.10	
Household Income Range			
Below $ 15,000	90	8.99	5.4
From $15,000 to $24,999	94	9.39	5.6
From $ 25,000 to $ 49,999	220	21.98	17.7
From $ 50,000 to $ 74,999	211	21.08	17.4
From $ 75,000 to $ 99,999	142	14.19	14.4
From $ 100,000 to $ 149,999	141	14.09	19.1
$ 150,000 or more	103	10.29	20.3
Diet			
Omnivore	880	87.91	
Vegetarian/Vegan	48	4.80	
Other	73	7.29	

Note: N = 1001.
The US population statistics are based on the 2019 American Community Survey 5-year estimate ().

wholegrain cereals; some protein-rich foods such as meat, fish, eggs and lentils; and some dairy foods" (definition adapted from U.S. Department of Agriculture Health and U.S. Department of Health and Human Services, 2020).

Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; while optimizing natural and human resources" (definition adapted from Food and Agriculture Organization of the United Nations et al., 2012).

The individual items, scale items, average values, variances, factor loadings, and Cronbach's alpha reliability coefficient are reported in Table 2.

2.3. Data analysis

STATA 17 was used to carry out the analyses. Before testing our hypotheses, the internal reliability, discriminant validity, and convergent validity of the measures were validated. Table 2 describes the measures and properties of the employed constructs.

As shown in Table 2, Cronbach's α, which examines the internal reliability, is above 0.7 for all the constructs and, hence, it is higher than the 0.7 threshold, which is considered acceptable by the literature (Cortina, 1993). Therefore, there is a high level of internal consistency for all the constructs of our model. As shown in Appendix Table A1 and A2, items were factor-analyzed by using maximum likelihood estimation and Promax rotation. For the standardized factor loadings, the results range from 0.51 to 0.97, with values greater than 0.5, which is considered acceptable by the literature (Chin, 1998). The AVE (average variance extracted) square roots were used to test discriminant validity. For all constructs, the AVE square roots were higher than the highest correlation with any other latent variable (Fornell and Larcker, 1981) (Table 3a and Table 3b).

Furthermore, the AVE values are above 0.5, which is an acceptable threshold based on the literature (Fornell and Larcker, 1981); thus, each construct guarantees the convergent validity of the measurements. As a result, the reliability and validity of the measurements in this study can be considered acceptable. Multicollinearity among variables was also tested using the variance inflation factor (VIF) (Appendix Tables A3 and A4). Since the literature (Kutner et al., 2004) suggests a cut-off value of 10.0 and obtained means VIF equal to 1.22 and 1.28 for a Healthy diet and Sustainable diet, respectively, these can be considered acceptable.

Because some constructs of a healthy diet and a sustainable diet were collinear, the two model groups were treated separately (Ayala and Manzano, 2014). This allowed us to deal independently with the two cognitive approaches to the different types of diet and to easily compare them.

Tables 3a and 3b represent the descriptive statistics and the correlation matrix of all the variables analyzed in our study.

3. Results

We tested our theoretical model (Fig. 1) through a linear regression model in which sociodemographic variables are used as covariates. These variables are crucial in illustrating the cognitive behavior of participants with respect to a healthy or a sustainable diet and, hence, are not considered mere control variables, as often occurs in the literature (Campbell et al., 2014; Park et al., 2021). Analyses were performed using Stata version 17 (StataCorp, 2021).

Tables 4a and 4b shows the results of linear regression models for a sustainable diet and a healthy diet, respectively. Some differences are present among the six proposed models, with three different incremental additions for both sustainable and healthy diets. While models A and D

Table 2
Multi-items constructs - Measures Description and Properties.

Measure and Source	Item Description*	Std. Factor Load. And Fact. Load. After Varimax Rotation (in parentheses)
Self-reported behavior (sustainable diet)[a]	*Please indicate the extent to which the following applies to you.*	
(SRSD)	x1: I eat local products whenever possible	0.51 (0.436)
α = 0.799	x2: I limit my meat consumption	0.70 (0.680)
AVE = 0.514	x3: I regularly eat organic food products	0.73 (0.677)
	x4: I regularly eat plant-based foods as an alternative to meat	0.88 (0.804)
Self-reported behavior (healthy diet)[a] (SRHD)	*Please indicate the extent to which the following applies to you.*	
α = 0.800	x5: I eat a variety of foods originating mainly from plants, rather than animals	0.67 (0.636)
AVE = 0.504	x6: I eat a variety of vegetables and fruits, at least 0.9 lb (400 gr) per day or 5 portions per day	0.64 (0.525)
	x7: I control my fat intake and replace most saturated fats with unsaturated vegetable oils or soft margarines	0.74 (0.671)
	x8: I replace fatty meat and meat products with beans, legumes, lentils, fish, poultry or lean meat	0.78 (0.746)
Involvement in sustainable diet[b]	*Please indicate your agreement about the following statements.*	
(ISD)	x9: Sustainable eating is very important to me	0.95 (0.895)
α = 0.967	x10: I care a lot about sustainable eating	0.97 (0.932)
AVE = 0.885	x11: Sustainable eating means a lot to me	0.96 (0.915)
	x12: I am very concerned about the consequences of what I eat in terms of sustainability	0.88 (0.854)
Involvement in healthy diet[b]	*Please indicate your agreement about the following statements.*	
(IHD)	x13: Healthy eating is very important to me	0.90 (0.869)
α = 0.928	x14: I care a lot about healthy eating	0.95 (0.908)
AVE = 0.779	x15: Healthy eating means a lot to me	0.94 (0.882)
	x16: I am very concerned about the health-related consequences of what I eat	0.72 (0.728)
Perception of sustainable diet[c]	*In my opinion, a sustainable diet is …*	
(PSD)	x17: Not tasty - Tasty	0.81 (0.695)
α = 0.853	x18: Unavailable - Easily Available	0.70 (0.718)
AVE = 0.599	x19: Not Filling - Filling	0.82 (0.790)
	x20: Difficult to Prepare - Easy to Prepare	0.76 (0.742)
Perception of healthy diet[c]	*In my opinion, a healthy diet is …*	
(PHD)	x21: Not tasty - Tasty	0.75 (0.630)
α = 0.805	x22: Unavailable - Easily Available	0.63 (0.688)
AVE = 0.512	x23: Not Filling - Filling	0.80 (0.732)
	x24: Difficult to Prepare - Easy to Prepare	0.67 (0.664)

[a] Measured on a 5-point scale from "Does not apply to me at all" (1) to "Fully applies to me" (5).
[b] Measured on a 5-point scale from "Strongly Disagree" (1) to "Strongly Agree" (5).
[c] Measured on a 5-point semantic differential scale.

Table 3a
Means, Standard Deviation, and Full Correlation among Study Variables – Sustainable diet.

		[1]	[2]	[3]	[4]
[1]	SRSD	**0.717**			
[2]	ISD	0.598	**0.941**		
[3]	PSD	0.434	0.535	**0.774**	
[4]	BMI	−0.167	−0.111	−0.096	
	Mean	*2.907*	*3.309*	*3.520*	*27.301*
	Std. Dev.	*0.994*	*1.035*	*0.883*	*6.186*
	No. of items	*4*	*4*	*4*	-
	Min	*1*	*1*	*1*	*15.338*
	Max	*5*	*5*	*5*	*49.917*

Note: N = 1001. Values in bold on the diagonal are the square root of the AVE. Correlation coefficients are all statistically significant at 99%.

Table 3b
Means, Standard Deviation, and Full Correlation among Study Variables – Healthy diet.

		[1]	[2]	[3]	[4]
[1]	SRHD	**0.710**			
[2]	IHD	0.583	**0.882**		
[3]	PHD	0.419	0.485	**0.716**	
[4]	BMI	−0.193	−0.095	−0.122	
	Mean	*3.144*	*3.906*	*3.754*	*27.301*
	Std. Dev.	*0.910*	*0.846*	*0.832*	*6.186*
	No. of items	*4*	*4*	*4*	-
	Min	*1*	*1*	*1*	*15.338*
	Max	*5*	*5*	*5*	*49.917*

Note: N = 1001. Values in bold on the diagonal are the square root of the AVE. Correlation coefficients are all statistically significant at 99 %.

only consider the sociodemographic variables (including the BMI), models B and E also incorporate other constructs. Specifically, model B considers the involvement in a sustainable diet (ISD) and the perception of a sustainable diet (PSD), while model E includes the involvement in a healthy diet (IHD) and the perception of a healthy diet (PHD). Finally, models C and F additionally consider the interaction among the main constructs and standardized variables of the interactions to avoid collinearity.

The fit indicators of the model (R2, Adj R2, and Incremental F-test) are good for all the models with the only exception of the F model. In the latter, the incremental F-test is not significant (2.29) due to the inclusion of the interaction between IHD and PHD, which also doesn't have a significant coefficient (Hair et al., 2009).

Both IHD and PHD have significant ($p < .01$) and positive coefficients (0.492 for Model E and 0.426 for Model F; 0.178 for Model E and 0.159 for Model F, respectively). This shows a direct and positive relationship between the perception of (PHD) and the involvement in (IHD) a healthy diet and self-reported healthy eating (SRHD). A similar trend is shown for the sustainable diet; ISD and PSD's coefficients are significant ($p < .01$) and positive (0.454 for Model B and 0.468 for Model C; 0.187 for Model B and 0.156 for Model C, respectively). This highlights a direct and positive relationship between the perception of (PSD) and the involvement in (ISD) a sustainable diet and self-reported sustainable eating (SRSD). Therefore, both H1a and H1b are confirmed.

On the other hand, and as previously mentioned, we obtained different results about the moderator role of the perception of a healthy diet and a sustainable diet. While in the sustainable diet model, the moderator shows a significant ($p < .05$) and positive (0.054) effect, this is not true for the healthy diet. Therefore, only the perception of a sustainable diet is a moderator between involvement in a sustainable diet and self-reported sustainable eating; for H2, the results support H2b only.

Furthermore, the model shows how several sociodemographic variables can influence consumers' self-reported healthy or sustainable

Table 4a
Model Comparison Results of Regression Model – Sustainable diet.

Dep. Var.: Self-reported behavior (sustainable diet) (SRSD)	Model A			Model B			Model C		
	estimate	seˆ	p	estimate	seˆ	p	estimate	seˆ	p
Age (baseline: 18–24)									
25–34	0.11	0.135	0.415	0.057	0.11	0.602	0.05	0.109	0.648
35–44	−0.055	0.128	0.668	0.048	0.108	0.661	0.044	0.107	0.686
45–54	−0.064	0.135	0.635	0.008	0.112	0.942	−0.006	0.111	0.957
55–65	0.011	0.14	0.936	0.104	0.116	0.37	0.08	0.116	0.492
Over 65	−0.175	0.15	0.243	−0.066	0.123	0.592	−0.095	0.124	0.441
Gender (baseline: male)									
Female	0.159*	0.063	0.012	−0.017	0.053	0.745	−0.012	0.053	0.814
Education (baseline: Primary education)									
Middle school	−1.139*	0.469	0.015	−0.781*	0.353	0.027	−0.802*	0.359	0.026
Secondary education (high school)	−0.369	0.445	0.408	−0.133	0.342	0.697	−0.175	0.348	0.615
Higher education at College/University (bachelor's or equivalent level)	−0.24	0.45	0.584	−0.074	0.341	0.823	−0.11	0.347	0.748
Graduate degree (Master's or doctoral degree)	−0.105	0.447	0.814	0.025	0.344	0.942	−0.013	0.35	0.97
Employment (baseline: full-time)									
Part-time/Other	−0.125	0.1	0.212	0.087	0.081	0.28	0.087	0.081	0.282
Unemployed	−0.346**	0.111	0.002	−0.158	0.085	0.065	−0.158	0.085	0.064
Retired	−0.098	0.103	0.343	−0.021	0.084	0.8	−0.008	0.085	0.923
Student	−0.141	0.18	0.434	0.025	0.169	0.882	0.01	0.167	0.952
Other	−0.215	0.156	0.17	−0.185	0.132	0.16	−0.176	0.132	0.184
Household Income Range (baseline: below $15,000)									
From $15,000 to $24,999	−0.017	0.156	0.911	−0.01	0.127	0.94	−0.014	0.127	0.91
From $ 25,000 to $ 49,999	0.055	0.138	0.688	0.08	0.107	0.455	0.077	0.106	0.467
From $ 50,000 to $ 74,999	0.116	0.141	0.409	0.132	0.111	0.233	0.129	0.11	0.249
From $ 75,000 to $ 99,999	0.193	0.153	0.206	0.253*	0.121	0.037	0.249*	0.12	0.039
From $ 100,000 to $ 149,999	0.203	0.147	0.169	0.267*	0.115	0.02	0.265*	0.114	0.02
$ 150,000 or more	0.215	0.161	0.181	0.267*	0.127	0.036	0.260*	0.126	0.039
Diet (baseline: omnivore)									
Vegetarian/Vegan	1.100**	0.096	0	0.799**	0.095	0	0.786**	0.093	0
Other	0.245	0.127	0.055	0.162	0.111	0.143	0.166	0.11	0.133
BMI	−0.019**	0.005	0	−0.010*	0.004	0.015	−0.010*	0.004	0.016
ISD				0.454**	0.028	0	0.468**	0.028	0
PSD				0.178**	0.033	0	0.159**	0.029	0
ISD X PSD							0.054*	0.023	0.021
Constant	3.538**	0.491	0	0.949*	0.393	0.016	3.092**	0.382	0
R^2	0.15			0.448			0.452		
Adj. R^2	0.129			0.434			0.437		
Incr. F-test	–			227.50**			5.37*		

Notes: N = 1001. Unstandardized estimates are reported. *$p < .05$; **$p < .01$. ˆ robust standard error.

eating. Thus, both H3a and H3b are partially confirmed. While gender has no influence on consumers' self-reported healthy or sustainable eating, in the case of a healthy diet, there is a significant ($p < .01$) and negative (−0.316 for Model E and −0.339 for Model F) coefficient for people aged over 65 years old, as represented in Table 3b (and this is the only significant effect for age among all models). Similarly, being unemployed or part-time/other workers significantly ($p < .05$) and negatively (−0.178 for Model E and −0.183 for Model F; −0.157 both for Model E and F, respectively) influences consumers' self-reported healthy eating. No effect of the employment status is present for a sustainable diet. Regarding education, middle school shows a significant and negative impact on self-reported sustainable eating. However, we only have 5 observations for middle school, hence a deeper analysis with more respondents within this group would be necessary. Another sociodemographic variable that showed a significant effect is income, which only influences consumers' self-reported sustainable eating in case it is higher than $75,000 (more specifically, there are three significant – $p < .05$ – levels of household income for sustainable diet: From $75,000 to $99,999, 0.253 for Model B and 0.249 for Model C; From $100,000 to $149,999, 0.267 for Model B and 0.265 for Model C; $150,000 or more, 0.267 for Model B and 0.260 for Model C). In the case of the BMI and diet, similar results are found both for healthy and sustainable diets. Vegetarian/vegan diets positively and significantly influence consumers' self-reported healthy and sustainable eating. On the other hand, the BMI influence is significant ($p < .01$) but negative for consumers' self-reported healthy and sustainable eating (−0.016 and −0.010, respectively).

3.1. Consumers' perceptions of and involvement in sustainable and healthy diets

Table 5 shows the perceptions of health and sustainable diets and highlights that the two diets are differently perceived by the respondents. Despite both diets being favorable and positively perceived, the healthy diet is recognized to be tastier, easier to prepare, more available, and more filling. Among the attributes, availability was considered the most critical aspect of a sustainable diet, with the lowest values. Differences between the perception of a healthy and a sustainable diet are significant ($p < 0.001$).

Table 6 shows the results of involvement in both sustainable and healthy diets. Although differences between a sustainable and a healthy diet are small, these are significant ($p < 0.001$), with involvement in sustainable eating being lower than involvement in healthy diets.

The different perceptions and involvement of customers for the analyzed diets confirm the importance of investigating these diets independently. The results show significant differences between sustainable and healthy diets, with the healthy diet having a higher involvement value and being more favorably perceived by respondents.

However, it should be noted that, according to Cohen (1998), the effect size is small for perception and medium for involvement. The reduced effect size for "perception" between the two types of diets may be attributed to several factors. Firstly, the use of a 5-point Likert scale in the survey responses may limit the variation in the means for the single items. Secondly, the literature suggests a potential overlapping effect in consumers' perceptions of sustainable and healthy diets for certain products (Aschemann-Witzel, 2015; Siegrist et al., 2015). As a result,

Table 4b
Model Comparison Results of Regression Model – Healthy diet.

Dep. Var.: Self-reported behavior (healthy diet) (SRHD)	Model D			Model E			Model F		
	estimate	seˆ	p	estimate	seˆ	p	estimate	seˆ	p
Age (baseline: 18–24)									
25–34	−0.017	0.124	0.891	−0.099	0.106	0.352	−0.106	0.105	0.314
35–44	−0.093	0.118	0.432	−0.075	0.105	0.475	−0.079	0.104	0.451
45–54	−0.103	0.122	0.402	−0.093	0.104	0.37	−0.101	0.104	0.331
55–65	0.049	0.125	0.7	−0.046	0.105	0.661	−0.062	0.104	0.55
Over 65	−0.27	0.14	0.054	−0.316**	0.117	0.007	−0.339**	0.116	0.004
Gender (baseline: male)									
Female	0.099	0.058	0.088	−0.059	0.048	0.222	−0.063	0.048	0.189
Education (baseline: Primary education)									
Middle school	−0.308	0.415	0.457	0.112	0.309	0.718	0.051	0.313	0.87
Secondary education (high school)	−0.198	0.403	0.623	−0.209	0.3	0.486	−0.251	0.3	0.404
Higher education at College/University (bachelor's or equivalent level)	−0.046	0.403	0.91	−0.12	0.3	0.689	−0.16	0.299	0.594
Graduate degree (Master's or doctoral degree)	0.19	0.404	0.639	0.014	0.302	0.962	−0.026	0.301	0.931
Employment (baseline: full-time)									
Part-time/Other	−0.223*	0.091	0.012	−0.157*	0.075	0.036	−0.157*	0.075	0.037
Unemployed	−0.326**	0.099	0.001	−0.178*	0.085	0.037	−0.183*	0.083	0.028
Retired	−0.022	0.095	0.821	−0.011	0.074	0.879	0.005	0.075	0.943
Student	−0.152	0.174	0.384	−0.183	0.136	0.18	−0.167	0.137	0.225
Other	−0.177	0.154	0.25	−0.22	0.127	0.083	−0.211	0.128	0.099
Household Income Range (baseline: below $15,000)									
From $15,000 to $24,999	0.039	0.135	0.771	0.019	0.117	0.874	0.015	0.116	0.898
From $ 25,000 to $ 49,999	0.013	0.124	0.92	−0.126	0.109	0.249	−0.116	0.106	0.274
From $ 50,000 to $ 74,999	0.066	0.127	0.604	−0.025	0.113	0.825	−0.022	0.11	0.845
From $ 75,000 to $ 99,999	0.082	0.137	0.55	−0.004	0.122	0.971	0.002	0.119	0.985
From $ 100,000 to $ 149,999	0.211	0.131	0.106	0.1	0.117	0.391	0.111	0.114	0.328
$ 150,000 or more	0.132	0.14	0.344	−0.042	0.123	0.731	−0.037	0.12	0.758
Diet (baseline: omnivore)									
Vegetarian/Vegan	0.830**	0.105	0	0.565**	0.084	0	0.558**	0.085	0
Other	−0.065	0.11	0.555	−0.043	0.092	0.641	−0.036	0.092	0.698
BMI	−0.023**	0.005	0	−0.016**	0.004	0	−0.016**	0.004	0
IHD				0.492**	0.034	0	0.426**	0.028	0
PHD				0.187**	0.036	0	0.156**	0.03	0
IHD X PHD							0.048	0.032	0.131
Constant	3.814**	0.438	0	1.277**	0.369	0	3.918**	0.333	0
R^2	0.15			0.434			0.438		
Adj. R^2	0.129			0.419			0.422		
Incr. F-test	–			170.47**			2.29		

Notes: N = 1001. Unstandardized estimates are reported. *p < .05; **p < .01. ˆ robust standard error.

Table 5
Perception of a sustainable and a healthy diet (measured on a 5-point semantic differential scale, with n = 1001).

	Sustainable				Healthy				Difference					
	Mean	SE	SD	95 % conf. Interval	Mean	SE	SD	95 % conf. Interval	Diff.ˆ	SD	95 % conf. Interval	t	Deg. Of fr.	Cohen Effect size
Not Tasty-Tasty	3.630	0.035	1.107	[3.562; 3.699]	3.806	0.036	1.124	[3.736; 3.876]	−0.176***	1072	[-0.242;-0.109]	−5.190	1000	−0.164
Unavailable-Easily Available	3.359	0.034	1.062	[3.293; 3.425]	3.751	0.310	0.975	[3.691; 3.812]	−0.393***	1042	[-0.457; 0.328]	−11.912	1000	−0.378
Not Filling-Filling	3.593	0.033	1.031	[3.529; 3.657]	3.769	0.345	1.093	[3.701; 3.837]	−0.176***	0,998	[-0.238;-0.114]	−5.577	1000	−0.176
Difficult to Prepare - Easy to prepare	3.499	0.328	1.037	[3.434; 3.563]	3.690	0.031	0.990	[3.629; 3.752]	−0.192***	0,928	[-0.249;-0.134]	−6.539	1000	−0.207

Note: For each item, t-tests in Stata 17 were used to test the equality of means between the two diets. All differences are significant (p < 0.001).

this difference, although statistically significant, may be reduced in the minds of consumers.

4. Discussion

In high-income nations, both food markets and regulators are characterized by a greater focus on health and sustainability (Pieniak et al., 2010; Testa et al., 2019; Commission, E., & Communication, D.-G. for, 2021; UN General Assembly, 2015). In this scenario, the present study applied socio-psychological models – which have been recognized as valuable tools in exploring dietary behaviors (Biasini et al., 2021) – to investigate the extent to which consumers' involvement in and perception of healthy and sustainable eating are related to their actual dietary behaviors. The proposed model examines perception, involvement, and sociodemographic determinants of self-reported healthy and sustainable eating and reveals the role of perception as a moderator between involvement and eating behaviors for US consumers. Considering the different perceptions and involvement of respondents towards the two diets, results were analyzed separately for healthy and sustainable eating. This is in contrast with previous work which found that

Table 6
Involvement of a sustainable and a healthy diet (measured on a 5-point Likert scale, with n = 1001).

	Sustainable				Healthy				Difference					
	Mean	SE	SD	95 % conf. Interval	Mean	SE	SD	95 % conf. Interval	Diff.^	SD	95 % conf. Interval	t	Deg. Of fr.	Cohen Effect size
It is important to me	3.364	0.034	1.073	[3.297; 3.430]	4.003	0.027	0.868	[3.950; 4.057]	−0.639***	0,973	[-0.700;-0.579]	−20.789	1000	−0.657
I care a lot about it	3.299	0.034	1.080	[3.232; 3.366]	3.898	0.029	0.931	[3.840; 3.956]	−0.599***	0,955	[-0.659;-0.540]	−19.854	1000	−0.627
It means a lot to me	3.267	0.035	1.094	[3.199; 3.335]	3.858	0.030	0.961	[3.799; 3.912]	−0.591***	0,973	[-0.652;-0.531]	−19.239	1000	−0.607
I am concerned	3.309	0.035	1.097	[3.241; 3.378]	3.865	0.031	0.970	[3.805; 3.925]	−0.556***	1002	[-0.619;-0.494]	−17.578	1000	−0.555

Note: For each item, t-tests- in Stata 17 were used to test the equality of means between the two diets. All differences are significant ($p < 0.001$).

these diets were similarly perceived (Van Loo et al., 2017). A possible explanation for this difference could be linked to cultural differences in the samples as this study focused on American consumers and not on EU countries, which were the target population of previous research (Van Loo et al., 2017).

However, several other factors contribute to differentiating healthy and sustainable diets. First, consumer interests may vary. Consumers with lower spending capacity often perceive sustainable diets as expensive, without seeing equivalent benefits, reducing their willingness to pay and influencing their purchasing behavior (Yilmazel, 2023). Our study shows that perception plays a moderating role in consumer involvement only for PSD. The different results of moderators between healthy and sustainable diets represent an interesting outcome. For sustainable diets, perception plays a more important role and implies that lower perceived importance leads to disengagement, particularly among those who cannot afford these products. This effect is not found in the case of a healthy diet.

Cultural and social factors also contribute to differences in the perception of healthy and sustainable diets (Gabriel et al., 2018). Our findings indicate a negative and significant relationship between healthy diet preferences and unemployed or part-time workers. Thus, despite more extensive analysis being needed to deeply understand the reasons for this negative relation, we can indeed underline the importance of the social context in shaping consumers' dietary choices.

In addition, from our analysis, recommendations emerge for marketers and policymakers concerning products associated with both healthy and sustainable diets. Specifically, some differences can be attributed to more effective marketing strategies for healthy products, such as shelf positioning, product labelling (Ikonen et al., 2020; Ilicic and Brennan, 2023) (e.g., highlighting healthier ingredients or reduced harmful content), and education efforts. Public institutions, such as university cafeterias (Wongprawmas et al., 2022), also contribute to promoting specific dietary choices. Our study found that greater consumer involvement is positively correlated with healthier eating behaviors. In addition to explaining these differences, marketing and media strategies, and educational efforts offer valuable tools for increasing consumer involvement and influencing dietary habits.

For sociodemographic characteristics affecting healthy dietary behaviors, our model suggested that age, employment status, dietary regimen, and BMI influence consumers' self-reported healthy eating. However, compared to previous studies (Robinson et al., 2023; Verain and Dagevos, 2022), we did not identify gender and education as affecting healthy eating habits. More in detail, our model highlighted that people over 65 years old and part-time and unemployed consumers are less likely to eat healthier, whereas vegetarians and people with a BMI in the healthy weight range adopt healthier eating habits.

Concerning sustainable diets, and in line with healthy diets, the BMI and dietary regimen affect sustainable eating habits. In addition, higher incomes are positively associated with the adoption of sustainable foods. This result is in line with a previous study on US citizens which found that higher-income consumers are more likely to adopt greener dietary behaviors (Willits-Smith et al., 2020). However, other variables identified in this study (i.e., gender and education) were not observed in our model as factors influencing sustainable eating, suggesting the need for further research on these factors.

In addition, our study showed that higher involvement (i.e., higher interest and importance in looking for healthy and sustainable products) was positively related to self-reported healthy and sustainable dietary behaviors and that consumers have a positive perception of both healthy and sustainable diets. Despite results indicating a favorable perception of and positive involvement in both diets, values for a sustainable diet were lower than values for a healthy one. Interestingly, our findings showed that perception is positively associated with both healthy and sustainable behaviors; however, the relationship between involvement and behavior is strengthened (moderated) by the role of perception for sustainable diets only. A possible interpretation of these results could be that consumers consider healthy eating to have a higher personal relevance than sustainable eating. As a consequence, consumer perception is more relevant in shaping involvement in behaviors that are less linked to the individual (i.e., sustainable eating) than in those having a higher personal relevance (i.e., healthy eating). By exploring the drivers of consumer behavioral changes on a representative sample of the US population, our data could be of use to policymakers and marketers to define strategies that could increase consumers' adoption of both healthy and sustainable diets. However, some limitations of this study should be noted. First, these findings might not apply to other sociocultural perspectives. Therefore, as a suggestion for future research, we invite experts to replicate this study and test the validity and generalizability across different contexts. Second, this study evaluated consumption behaviors using self-reported measures, which might deviate from consumers' actual behavior due to potential social desirability, post-rationalization, and cognitive dissonance or consonance. Therefore, further studies should include more objective measurements to assess consumer behavior. Third, we assessed consumer behaviors using a 4-item scale. Because more comprehensive scales exist in the literature to assess healthy and sustainable diets, we suggest adopting other scales in future research (e.g., the SHED Index (Tepper et al., 2021). Finally, the majority of our respondents were omnivores and only a few were vegetarians/vegans, who were aggregated in the analysis. Due to the variety of eating habits, next studies should consider using dietary pattern scales (e.g., Amato et al., 2022) to explore how different diets (e.g., flexitarians) could influence consumption behaviors.

4.1. Policy and business implications

The findings from this study could be used as a starting point to explore and test possible solutions that could support specific groups of the population in their dietary decisions. For instance, education and awareness campaigns could be promoted to target different age groups (e.g., elderly consumers) and/or environments (e.g., work offices and

schools). In addition, given that higher incomes were associated with sustainable eating and that sustainable diets were considered less available, there is a need to make sustainable food products more accessible and handier to lower-income consumers.

The positive association between involvement and healthy and sustainable eating could be of special interest to marketers and policymakers, who could encourage the consumption of these foods by increasing their widespread in public spaces, such as college canteens and retailers. In addition, it is possible to steer consumers' decisions toward healthy and sustainable food choices by using nudging strategies that could alter the product arrangement (i.e., visibility enhancements, such as product placement) (Andreani et al., 2024). Since involvement influences how information is processed and how decisions are made, an additional strategy could be the use of a harmonized and easy-to-recognize labeling system that could support timely and informed food choices (van Bussel, Kuijsten, Mars, & van 't Veer, 2022; Van Loo et al., 2017). Studies emphasize that interpretative labeling (e.g., color-coded front-of-pack labels) has the potential to support consumers in identifying healthy and less healthy food products (Anastasiou et al., 2019; Carlsson et al., 2022; Temple, 2020). A dual-labeling interpretative front-of-pack approach, which includes both a nutrition and a sustainable label – and which has not been extensively investigated in the literature (De Bauw, Matthys, Poppe, Franssens and Vranken, 2021; Potter et al., 2023) – could be tested to make healthy and sustainable foods easily recognizable at the point of purchase and support consumers.

Although both healthy and sustainable diets were favorably perceived in our study, their perception could still be improved, especially for sustainable diets. As a matter of fact, sustainable diets were perceived as less tasty, less easy to prepare, less available, and less filling when compared to healthy ones. These differences highlight the need to make sustainable diets more appealing to consumers, which could be supported by the implementation of communication strategies focused on improving these goals throughout the entire supply chain. For instance, the packaging of sustainable food products could stress the "easy to prepare" or hedonistic aspects, and labeling schemes/certifications could be used to help consumers identify trusted sustainable products. Companies could use organic and/or quality labels from external certification bodies to increase the trustworthiness of products and attract consumers. Farm-to-table (F2T), alternative food networks (AFN), urban farming, farmers' markets, and short food supply chains might represent an additional solution to increase the availability of sustainable and healthy food products (Migliore et al., 2015). These environments could also improve consumers' involvement in healthy and sustainable eating by direct interaction with producers (Sacchi, 2018).

Finally, in our model, perception acted as a moderator for sustainable eating only. Therefore, from a marketing perspective, improving the perception of sustainable products (e.g., organic or plant-based foods) would be of special importance to support the adoption of greener dietary behaviors. For instance, communication campaigns could be used to emphasize sensory aspects and, thus, strengthen the relationship between involvement and behavior.

5. Conclusion

The objective of this study was to examine the extent to which individual-level determinants influence self-reported healthy and sustainable eating behaviors. The findings could be valuable for both companies and policymakers in shaping strategies to guide consumers' dietary choices. Given the different perceptions and involvement levels of respondents towards the two diets, the model employed in this research considered healthy and sustainable diets separately, despite being jointly examined in previous works. This approach enabled us to analyze results independently, compare findings, and propose more punctual and actionable insights for influencing American consumers' food choices. Our findings reveal a generally positive perception and involvement in both diets and support the design of policies focused on food sustainability aspects.

CRediT authorship contribution statement

Giovanni Sogari: Writing – review & editing, Writing – original draft, Investigation, Funding acquisition, Conceptualization. **Tommaso Pucci:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Giulia Andreani:** Writing – review & editing, Writing – original draft, Visualization, Methodology. **Niccolò Fiorini:** Writing – review & editing, Writing – original draft, Methodology.

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.

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Appendix

Table A1
VIF scores and tolerances among non-dichotomic study independent variables – Sustainable diet

Variables	VIF scores	Tolerance
ISD	1.41	0.711
PSD	1.40	0.713
BMI	1.01	0.986

Mean VIF: 1.28. Condition number: 15.379.

Table A2
VIF scores and tolerances among non-dichotomic study independent variables – Healthy diet

Variables	VIF scores	Tolerance
IHD	1.31	0.763
PHD	1.32	0.759
BMI	1.02	0.984

Mean VIF: 1.22. Condition number: 17.089.

Data availability

Data will be made available on request.

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