Sustainable Production and Consumption 56 (2025) 519–530

Contents lists available at ScienceDirect

Sustainable Production and Consumption

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

Can we prime sustainable food choices? A randomized controlled trial nested within a discrete choice experiment

Qiuyan Liao [a,*], Esther K. Papies [b,c], Yuyi Chen [a], Meijun Chen [a], Meihong Dong [d], Wendy Wing Tak Lam [a]

[a] Division of Behavioural Sciences, School of Public Health, The University of Hong Kong, Hong Kong, China
[b] Behavioural Science Institute, Radboud University, Nijmegen, the Netherlands
[c] MRC/CSO Social and Public Health Sciences Unit, School of Health and Wellbeing, University of Glasgow, United Kingdom
[d] Affiliated Foshan Hospital of Southern Medical University, Guangdong, China

ARTICLE INFO

Editor: Prof. K Tsagarakis

Keywords:
Eco-friendly
Sustainable food choices
Goal priming

ABSTRACT

To encourage more sustainable food choices, consumers should be informed about the environmental impacts of foods. Labelling schemes that reflect the characteristics of food production are important initiatives to change consumer behaviours. This study was aimed to test whether goal priming can increase the effects of an eco-friendly label relative to other sustainability claims in determining sustainable food choices. A discrete choice experiment (DCE) was conducted to measure the importance of an "eco-friendly" label versus a) other sustainability claims, b) taste preference and c) price in impacting preferences for three food categories: meat, vegetables and dairy, among 956 adult participants. To examine the effects of goal priming on the importance of an eco-friendly label, participants were randomized to either a control group or one of the three goal priming conditions: health-benefit priming (HP), environmental-benefit priming (EP), and co-benefit priming (CP), to complete the DCE. We found that EP and CP, compared with HP, had stronger effects on increasing participants' preferences for foods with eco-friendly and organic labels and reducing the importance of taste preference and price in determining food choices. Furthermore, the study found that the effects of HP, EP and CP on increasing the importance of eco-friendly labels were more promising for participants with higher self-transcendence values. This study offers important evidence to support the development of a holistic eco-labelling scheme for foods and highlights the importance of activating the goal of positive environmental impacts or co-benefits for both human and environmental health for promoting sustainable food choices.

1. Introduction

The global food system is estimated to contribute 34 % (25 %–42 %) of total anthropogenic greenhouse gas (GHG) emissions, which equates to 14 to 22 Gt CO_2-equivalent emissions per year (Crippa et al., 2021). Reducing GHG emissions from the food system is not only essential to meet the target of a 1.5 °C or 2 °C global temperature increase limit (Clark et al., 2020) but would also bring benefits to population well-being (Gao et al., 2018; Karlsson et al., 2020). Hence, food production and consumption should be transformed to be more sustainable to nurture a growing population and support environmental sustainability (Willett et al., 2019). Food production should comprehensively consider GHG emissions, land and water use, fertilizer use, biodiversity loss, and chemical pollution from pesticides and herbicides at the farm level (Foley et al., 2011). Beyond the farm gate, food manufacturing, distribution, retail, packaging, and refrigeration also consume substantial natural resources and energy, contributing to a major share of the total GHG emissions arising from the food system (Crippa et al., 2021). Consumers' awareness of and demand for environmentally friendly foods are crucial to drive sustainable food production transformation. However, it is challenging for consumers to determine the environmental impact of foods if information about the food production process is not visible (Annunziata et al., 2019; Lazzarini et al., 2018). This highlights the importance of food producers and manufactures informing consumers about the characteristics of the food production process and its environmental impact to support sustainable food choices.

In response to the growing demand for sustainable food production, various labelling initiatives, such as labels that indicate organic

* Corresponding author at: 2/F, Patrick Manson Building (North Wing), 7 Sassoon Road, Pokfulam, Hong Kong.
E-mail address: qyliao11@hku.hk (Q. Liao).

https://doi.org/10.1016/j.spc.2025.04.021
Received 12 November 2024; Received in revised form 29 March 2025; Accepted 26 April 2025
Available online 28 April 2025

production, food miles, and water use, have been introduced to indicate the characteristics and environmental sustainability of food production (Janßen and Langen, 2017; Potter et al., 2021). Most sustainability claims indicate only one or some aspects of the environmental impact of foods. Hence, there have been strong calls for a more stringent and comprehensive ecolabelling scheme to consider chemical use, GHG emissions, and consumption of natural resources (Brown et al., 2020; Czarnezki, 2011). While making the sustainability characteristics of foods visible is important to guide consumers' sustainable food choices, the hedonic process and immediate reward of food choices, such as taste and the pleasure of eating, can compete for consumers' attention (Leng et al., 2017), driving them towards unhealthy and unsustainable food consumption. Behavioural strategies are needed to increase the salience of those sustainability cues and reduce the impact of immediate rewards to promote sustainable food choices. Therefore, this study was primarily aimed to examine the effects of goal priming, a type of nudging interventions to activate or create mental associations between a goal and a target behaviour (Papies, 2016), for promoting consumers' preference for sustainable foods. Especially, we would like to examine whether goal priming can increase the impact of an eco-friendly label, a label indicating the overall environmental impact of foods throughout production chains, on consumers' food choices. Sustainable food consumption brings benefits to both the environment and human health (Gao et al., 2018; Karlsson et al., 2020). Goal priming for sustainable food consumption can focus on either the environmental benefits, human health benefits, or co-benefits. Since goal priming is more effective if the primed goal is more desirable for the target group, the effects of goal priming can be modified by consumers' orientation values (Papies, 2016). Therefore, we also aimed to examine how the effects of priming with different goals would be differed by consumers' orientation values.

To achieve these aims, we conducted a randomized controlled trial where participants were randomly allocated to four conditions, the control, health-benefit priming (HP), environmental-benefit priming (EP), and co-benefit priming (CP). After receiving their respective treatment, all participants completed a discrete choice experiment (DCE) questionnaire to examine their preferences for foods varied by environmental sustainability attributes and other characteristics. This paper is structured into six sections. Following this section, Section 2 reviews related literature and outlines the hypotheses of the study. Section 3 offers details of DCE design, the priming interventions, major study measures, participants, and statical analyses. Section 4 reports the results, while Section 5 discusses the main findings and limitations of the study, and Section 6 makes a conclusion based on the study findings.

2. Literature review and development of hypotheses

This section begins with reviewing the current sustainability characteristics of food products, their potential influences on consumers' food choice preferences, and their limitations, underscoring the importance of developing eco-friendly labelling schemes to inform consumers about the overall environmental impact of foods. Following this, the section delves into the potential effects of goal priming in enhancing consumers' preferences for eco-friendly labelled foods, and the potential modifying effects of social orientation values on the goal priming effects. The hypotheses of this study are outlined within the discussion.

2.1. Sustainability characteristics of food products and consumers' preferences

The impact of various sustainability characteristics on consumers' food choice preferences have been reported in the literature. Among these sustainability characteristics, organic production has been extensively studied. A systematic review indicated that consumers were willing to pay more for foods with an organic label, and their willingness to pay was higher than for other sustainability labels (Bastounis et al., 2021). Labels of local origin are also increasingly used in food markets to indicate food miles (Meyerding et al., 2019). Research consistently indicates that consumers have a greater preference and are willing to pay more for local foods (Gracia, 2014; Profeta and Hamm, 2019). However, locally produced foods may sometimes encompass conflicting features. For example, locally grown vegetables with greenhouse production could have greater environmental impact than seasonal foods that are imported, especially if the foods are transported by means other than aviation (Stoessel et al., 2012). In the food distribution stage, the packaging of foods plays a more significant role in GHG emissions compared to food miles (Crippa et al., 2021). There is evidence that consumers are willing to pay a premium for unpacked foods over those in non-recyclable plastic (Herrmann et al., 2022), but others' study indicates that food packaging is a less salient criterion for consumers when considering the environmental impact of foods (Tobler et al., 2011).

Compared with other food production process characteristics, genetic modification and hormone use, are subject to more controversies regarding their environmental impact (Capper, 2011; Eiseman, 2008; Prusak et al., 2014), but receive high public concern. Beyond health concern, consumers may exhibit greater preference for foods free of genetically modified organism ("GMO-free") or growth hormone ("hormone-free") due to ethical concerns, preservation of the tradition, fear of the "unknown", and moral and cultural values (Eiseman, 2008; Finucane and Holup, 2005). The popularly used "natural" production claims somewhat overlap with the "GMO-free" and "hormone-free" claims. Food products with natural claims were perceived to be more likely GMO-free, minimally processed, organic, and healthier (Berry et al., 2017). Despite their controversial nature, these food production claims are commonly used by food producers as cues to attract consumers in food purchase (Janßen and Langen, 2017; Simão et al., 2022).

The above sustainability characteristics and claims focus on one or some aspects of the environmental impact of food. The development and implementation of comprehensive ecolabels (hereafter termed "eco-friendly labels") for foods are lagging (Prieto-Sandoval et al., 2020). Eco-friendly labelling schemes that provide information on the environmental impact of foods throughout their production chain are valuable initiatives aimed at guiding consumers towards sustainable food choices. However, research found that eco-friendly labels had only a small effect on consumers' sustainable food choices (Lazzarini et al., 2018; Potter et al., 2021), indicating limited use of the eco-friendly labels by consumers. Therefore, it is crucial to explore strategies to enhance the salience of eco-friendly labels and consequently their impact on consumers' decisions towards sustainable food choices.

2.2. Priming as a strategy to increase the salience of sustainability cues

Although food sustainability labels can inform consumers about the sustainability of food choices, making sustainable food choices remains challenging owing to the temptation of more immediately rewarding features of foods, such as taste and price (Fox et al., 2021; Hoek et al., 2017). According to the temporal construal theory (Liberman and Trope, 1998; Trope and Liberman, 2000), consumers can experience competing motives when making food choices. Specifically, the more distant goals, such as health and environmental sustainability, are more abstract and less accessible, while the short-term goals, such as eating for pleasure, can be more concrete and mentally accessible, in influencing food choices. Various cues such as food prices, images, and labels can compete for consumers' attention to activate specific goals of food choices. Tempting and rewarding cues usually activate more automatic and habitual responses, such that taste preferences, for instance, are more salient in determining actual food choices than environmental concerns (Papies and Barsalou, 2015; Papies et al., 2020a). Priming is an interventional strategy that helps individuals to shift attention towards different cues and hence changes the weights between overarching values in determining behaviours (Henson, 2003). Priming, as a type of nudging (Leng et al., 2017), is implemented by introducing subtle stimuli, such as value-relevant words, to influence individuals'

behaviours, often without their conscious awareness (Papies, 2016). During food purchase, due to the constraints of cognitive function and time, consumers can only selectively process a few characteristics of the products (Leng et al., 2017). Priming can activate certain mental associations stored in memories or help established such mental associations (Leng et al., 2017; Papies, 2016; Wilson et al., 2016). Priming, if implemented at the point of food choices, can enhance the accessibility and salience of such mental associations and guide consumers' food choices more efficiently (Leng et al., 2017; Papies, 2016; Wilson et al., 2016). If the primed concept is relevant to a goal, the intervention is termed goal priming (Papies, 2016).

For sustainable food consumption, several studies have examined the effects of appealing to the goals of sustainable diets, either health benefits, environmental benefits, or co-benefits, on participants' food choices (Carfora et al., 2019; Carrico et al., 2017; Shreedhar and Galizzi, 2021; Wolstenholme et al., 2020). All these studies found that providing information about either the health or environmental benefits of sustainable diets increased participants' choices of vegetarian foods or reduced red and processed meat consumption. However, appealing to the co-benefits of sustainable diets was not more effective than single-benefit information (Shreedhar and Galizzi, 2021; Wolstenholme et al., 2020) or had no effect (Carfora et al., 2019). Except for Carrico et al. (2017), these studies mainly used informational interventions, focusing on changing participants' attitudes and intention (Carfora et al., 2019; Shreedhar and Galizzi, 2021; Wolstenholme et al., 2020). Using persuasive messages may trigger psychological reactance if participants have no interest in the information or the target behaviours. Goal priming, however, is less obtrusive, and usually not directly linked to the target behaviour. It focuses more on activating the nonconscious regulatory processes of behavioural change and is thereby more acceptable to the target group (Papies, 2016).

Previous studies have demonstrated the effects of goal priming with simple words (e.g., 'slim figure') for reducing intake of snacks or increasing choice of healthy foods (Papies and Hamstra, 2010; Papies and Veling, 2013). A recent systematic review identified two studies that used priming to effectively promote healthy diets (Gynell et al., 2022). Another systematic review suggests that priming, when combined with food health labelling, can enhance the effectiveness of promoting consumers' healthy food choices compared to health labelling alone (Wilson et al., 2016). This synergy may be because priming can increase the visibility and mental accessibility of food health labels. The findings highlight the potential of using priming as a strategy to enhance the effects of eco-friendly labels for promoting consumers' sustainable food choices. Therefore, we test the hypothesis that:

H1. Goal priming with either the health benefits, environmental benefits, or co-benefits of sustainable diets, can increase the effects of eco-friendly labels and other sustainability labels, but reduce the effects of price and taste in impacting food choices.

2.3. Can priming effects be modified by orientation values?

Based on the value-belief-norm theory, values are severed as the overarching principles to shape human beliefs, attitudes, and norms, which in turn influence behaviours (Nordlund and Garvill, 2002; Stern et al., 1999). Shwartz clusters human values into four domains, openness to change, conservation, self-transcendence, and self-enhancement (Schwartz, 2012), with the latter two deemed more relevant to sustainable action. Previous research has consistently shown that self-transcendence values (focusing on the benefits of others, the society or the environment) positively correlate with environmental concerns and pro-environmental behaviours (Corner et al., 2014). Conversely, self-enhancement values (focusing on self-focused benefits or goals) negatively correlate with environmental concerns and pro-environmental behaviours (Corner et al., 2014). Values also guide how information is processed and hence modify the effects of informational interventions. Research indicates that information framed to align with participants' pre-existing values has greater effects on targeted behavioural changes (Birkenbach and Egloff, 2024; Lagerkvist et al., 2023). Based on such value-congruent effects, it is therefore possible that goal priming is more effective if the primed goals are congruent with participants' values. Consumers are heterogeneous in their food choice motives and the values attached to a range of food attributes (Verain et al., 2017). The "pro-self" individuals tend to prioritize the more egoistic goals, such as price, taste, and health, while the more prosocial individuals might attach greater importance to the sustainability of foods (Verain et al., 2017). It is possible that HP is more effective for the "pro-self" consumers whereas EP is more effective for more prosocial individuals. In this regard, CP is likely to attract consumers with diverse values. Since we are interested in strategies to enhance the effect of an eco-friendly label for promoting sustainable food choices, it is important to explore the modification effects of orientation values on the effectiveness of different goal priming in promoting preferences for eco-friendly labelled foods. This can offer deeper understanding about the underlying psychological process of the combined effects of priming and eco-friendly labelling on sustainable food choices. We hypothesize that:

H2. HP will have a greater effect on increasing the effects of eco-friendly labels for more pro-self-individuals (indicated by higher self-enhancement values), whereas EP will have a greater effect for more prosocial individuals (indicated by higher self-transcendence values), and CP will have a greater effect for both pro-self and more prosocial individuals.

3. Methods

This study was a DCE with a nested randomized control trial implemented online using Qualtrics software. Participants were first randomly allocated to four conditions, the control, HP, EP, and CP to receive their respective treatment. Thereafter, they all completed the same DCE tasks to examine their preferences for foods with specific attributes and attribute levels. The study was pre-registered in https://clinicaltrials.gov (Registration Number: NCT04955301).

3.1. The design of the discrete choice experiment

DCEs are commonly used in consumer research to investigate the importance of one attribute relative to others in impacting consumers' preferences (Lizin et al., 2022; Ryan et al., 2001). In DCEs, a series of choice sets is presented to participants, with each choice set presenting two or more alternatives with various attributes and attribute levels. By recording participants' choices in each choice set, DCEs measure the degree to which individuals weight an attribute against other attributes, hereafter referred as "importance", in making choices (Hoyos, 2010). A higher importance score indicates a stronger influence of the attribute on preferences or choices. The design of the DCE questionnaire began with the selection of attributes of food products (e.g., organic production, price) and attribute levels (e.g., organic vs. nonorganic). Previous studies indicate that the attributes that are important for determining food choices differed by food product category (Lazzarini et al., 2018; Verain et al., 2017). Therefore, in the current study three main food categories—meat, vegetables, and dairy products—were included to enhance the generalizability of the findings.

Based on the literature review in Section 2, besides the "eco-friendly" label, four attributes of production claims related to environmental sustainability were included for each food category but varied slightly: "organic", "local", "natural", and "hormone-free" for meat; "organic", "local", "in-season", and "packaged" for vegetables; and "organic", "local", "natural", and "GMO-free" for dairy. The eco-friendly logo was designed by the research team to indicate that the foods were produced with fewer carbon emissions and consuming fewer natural resources, while other food production claims were presented in the way they are

commonly presented in local food markets. The attribute of "packaged", denoting plastic packaging, was assigned solely to vegetable produce because removing plastic packaging for fresh produce sold in supermarket is considered more feasible than for the other two food categories (White and Lockyer, 2020). Moreover, for each food category, two more attributes, "price" and "taste preference", that represent the more immediate cost/benefit of food choices were included to enable examination of participants' trade-offs between the long-term and short-term goals of food choices. The price for each food category was set at four levels to cover the possible price ranges of the respective food categories in the local markets. Taste preference was included as an attribute by combining food type and consumers' sensory experiences. For instance, in the meat category, chicken and pork were included as two types of meat products in the DCE. For participants who indicated that they preferred chicken over pork in the survey, a "better taste" was coded for the taste preference attribute if chicken is presented as one choice in the choice set, whereas "no better taste" was assigned to the taste preference attribute if pork is presented as the choice. Detailed descriptions of the attributes and attribute levels for each food category are provided in Table 1.

Based on the selected attributes and attribute levels, a fractional factorial design based on orthogonal arrays was employed to reduce the total number of choice sets required in the DCE but maintain at least 80 % efficiency compared with the complete factorial design to detect all main effects (35). This generated eight choice sets for each food category and, thereby, a total of 24 choice sets, each presenting two hypothetical food products of the same food category. One additional choice set, within which an alternative is obviously superior to another, was included at the beginning of the DCE tasks for rationality test. Within each choice set, participants were asked to indicate their preferred option between two available food products. A no-choice option was not included to maximize the utilization of preference information, though it is suggested that adding the no-choice option would be valuable for estimating market shares (Lizin et al., 2022). Examples of one choice set for each food category are shown in Fig. 1. We included a barcode for each food product in the choice tasks to introduce a sense of real-world food shopping to participants' decision-making process. A full list of

Table 1
Attributes and attribute levels of each food category for the design of the discrete choice experiment.

Attribute by food category	Attribute level
Meat products	
Type of meat [a]	Pork; Chicken
"Eco-friendly"	Present; Absent
"Organic"	Present; Absent
"Local" label	Present; Absent
"Natural"	Present; Absent
"Hormone-free"	Present; Absent
Price (in HKD)	40; 60; 80; 100
Taste preference	The presented food type fit to their taste preference (better taste); no better taste
Vegetable products	
Type of vegetables [a]	Cabbage; Broccoli; Lettuce; Romaine
"Eco-friendly"	Present; Absent
"Organic"	Present; Absent
"Local"	Present; Absent
"In-season"	Present; Absent
Packaged [b]	Packaged; Unpacked
Price (in HKD) [c]	15; 30; 45; 60
Taste preference	The presented food type fit to their taste preference (better taste); no better taste
Dairy products	
Type of dairy product [a]	Milk; Soy milk
"Eco-friendly"	Present; Absent
"Organic"	Present; Absent
"Local"	Present; Absent
"Natural"	Present; Absent
"GMO-free"	Present; Absent
Price (in HKD)	10; 20; 30; 40
Taste preference	The presented food type fit to their taste preference (better taste); no better taste

[a] The type of foods in each category was not included as an attribute but combined with participants' taste preference to generate the "taste preference" attribute; [b] The vegetables are either packed with a transparent plastic bag or unpacked; [c] 1HKD = ~0.13USD.

Fig. 1. Examples of one food choice set for (A) meat, (B) vegetables, and (C) dairy products, respectively.

attributes of the choice sets presented to participants are provided in Supplementary Material S1.

3.2. Priming interventions and control

Before the DCE, participants were randomized to each of the four conditions: the control, HP, EP, and CP, using a ratio of 1:1:1:1. In the control condition, participants were asked to search for venues that offered food among the 16 listed venues. In the three priming conditions, participants were first given information about what sustainable diets are using the same statement of "sustainable diets (also known as 'low-carbon diets') are to reduce carbon emissions and promote food sustainability through a dietary pattern of more vegetables and less meat." Following this statement, participants were told that sustainable diets have many benefits for human health (for HP), the environment (for EP), or both (for CP). Then, participants were asked to search for five among 16 listed options that were relevant to health benefits (for HP), environmental benefits (for EP), and co-benefits (for CP), of sustainable diets, according to their respective priming conditions (Supplementary Material S2). Overall, participants spent <1 min completing the task. These priming tasks are analogous to word/statement-searching exercises commonly used as priming interventions in previous studies (Boland et al., 2013; Engeser et al., 2006).

3.3. Measures of social orientation values and demographics

Following the DCE, participants completed a short questionnaire to assess their social orientation values using the 14-item Portrait Value Questionnaire (PVQ). The PVQ consists of two dimensions: self-transcendence and self-enhancement (Graham and Abrahamse, 2017; Krystallis et al., 2008). Each item was rated on a scale ranging from "1=not like me at all" to "6=very much like me". We conducted principal component analysis of our PVQ data. The results indicated 9 items for measuring self-enhancement (e.g., "Being successful is important to him (her)"; "He (she) likes to impress other people") (Cronbach's $\alpha = 0.85$) and 5 items for measuring self-transcendence (e.g., "It is important to him (her) to respond to the needs of others", "He (she) tries to support others he (she) knows") ($\alpha = 0.80$). Mean scores were calculated for the 9 items related to self-enhancement and the 5 items related to self-transcendence for subsequent data analyses. A higher score indicates a stronger orientation towards self-interest values for self-enhancement and a greater emphasis on prosocial values for self-transcendence. We also collected participants' gender, age, educational attainment, marital status, and family income, as well as information on whether they had a young child, and whether they had chronic disease(s).

3.4. Sampling and participant recruitment

Data collection was conducted in September–December 2022. Participants were recruited by a local public poll institute that maintains an online panel consisting of over 100,000 Hong Kong adults who were previously recruited using random digital dialling. All subjects on the panel had given their mobile phone numbers and consent for future research. Participants were invited to participate in the survey via a message delivered to their mobile phones. The study was introduced as "a study to understand Hong Kong adults' food choice preferences". Participants could click on a study hyperlink via the message to view the study information sheet and give informed consent by clicking "I agree to participate in the study" to proceed to a page that screens for subject eligibility. Participants had to be aged 18 years or above and able to read Chinese because the intervention materials were in Chinese. Participants who were vegan or vegetarian, or those who followed special diets due to diseases or religious reasons or were currently on a diet were excluded. Two additional reminders were sent to those who did not respond to our invitation, with each sent two weeks apart. Overall, the entire study procedure took approximately 20–25 min. Each participant received an incentive of ~$6.4 to compensate for their time. The study received ethical approval from the Institutional Review Board of the University of Hong Kong (Reference No.: UW 20–233).

3.5. Sample size and participants

The sample sizes in DCE were based on Orme' formulation of sample size (n) ≥ 500c/ta (Orme, 1998) within which "c" is the largest number of levels for any one attribute, "t" is the total choice sets for each participant, and "a" is the number of alternatives in each choice set. With c = 4, $t = 8$, and a = 2 in our DCE design, the minimal sample size required for each condition is 125. Recent research suggests a minimal sample size of 190 to detect a specific attribute effect with 95 % confidence intervals and a statistical power of 80 % (de Bekker-Grob et al., 2015). To allow for the potential exclusion of 20 % of the subjects during data analyses, we aimed to recruit at least 240 for each group.

A total of 1000 participants, with 250 in each condition, completed this study. We excluded 11 (4.4 %), 8 (3.2 %), 13 (5.2 %), 8 (3.2 %) participants who failed the rationality test in the DCE task from the control, HP, EP, and CP group, respectively, because they may have had insufficient understanding of or attention for the task. Though not pre-registered, two participants from the EP group and another two from the CP group, who failed to choose any statements relevant to their respective priming conditions during the priming task, were excluded from data analyses because they may not have been successfully manipulated. Therefore, the final sample size used for analyses was 239 for the control, 242 for HP, 235 for EP, and 240 for CP. Overall, the sample comprised 58.8 % females; 38.6 %, 43.8 %, and 17.6 % were adults aged 18–34, 35–54, and 55 years or above, respectively; and around 55 % having a tertiary educational achievement or above. Participants' demographics and self-enhancement and self-transcendence values didn't differ across the control and priming conditions, indicating successful randomization. Details about participants' demographics and social orientation values across conditions are shown in Table S1, Supplementary Material.

3.6. Data analysis

For data analysis, first, participants' demographics and social orientation values were compared across the four conditions using either Pearson Chi-square test (for categorical variables) or one-way analysis of variance (for continuous variables) to assess the success in randomization. Then, mixed logit modelling (MLM) was conducted to assess the preference weight of each attribute or attribute level in determining food choice. MLM can accommodate individual-specific variance in preference and within-subjects correlation over repeated choices (Hauber et al., 2016). The "logitr" package in R version 4.3.1 with multi-start search was used to run MLM (Helveston, 2023).

To test H1, we first ran a main model for each food category in which the preference weights and their 95 % confidence intervals of each attribute and attribute level were estimated using MLM without including the interactions between the priming condition and food attributes (Formula 1–3). The main model for each food category was run with the whole sample because the patterns of preference weights for the included attributes in the whole sample were consistent with those in the model run with only the control group. Subsequent MLM was run with the whole sample to ensure all models were run using the same respondents.

For meat:

$$V_{ijt} = \alpha_1 \text{"Price"}_{ijt} + \beta_{1.1} \text{"Eco}-\text{friendly"}_{ijt} + \beta_{1.2} \text{"Organic"}_{ijt} + \beta_{1.3} \text{"Local"}_{ijt} + \beta_{1.4} \text{"Natural"}_{ijt} + \beta_{1.5} \text{"Hormone}-\text{free"}_{ijt} + \beta_{1.6} \text{"Better taste"}_{ijt} + \varepsilon_{1ijt} \quad (1)$$

For vegetables:

$$V_{ijt} = \alpha_2 \text{"Price"}_{ijt} + \beta_{2.1} \text{"Eco}-\text{friendly"}_{ijt} + \beta_{2.2} \text{"Organic"}_{ijt} + \beta_{2.3} \text{"Local"}_{ijt} + \beta_{2.4} \text{"In}-\text{season"}_{ijt} + \beta_{2.5} \text{"Packaged"}_{ijt} + \beta_{2.6} \text{"Better taste"}_{ijt} + \varepsilon_{2ijt} \quad (2)$$

For dairy:

$$V_{ijt} = \alpha_3 \text{"Price"}_{ijt} + \beta_{3.1} \text{"Eco}-\text{friendly"}_{ijt} + \beta_{3.2} \text{"Organic"}_{ijt} + \beta_{3.3} \text{"Local"}_{ijt} + \beta_{3.4} \text{"Natural"}_{ijt} + \beta_{3.5} \text{"GMO}-\text{free"}_{ijt} + \beta_{3.6} \text{"Better taste"}_{ijt} + \varepsilon_{3ijt} \quad (3)$$

In all three equations, except price which was treated as a continuous predictor, other attributes were included as dichotomous predictors. In the equations, "*i*" represents the choice alternative, "*j*" represents a specific individual, and "t" represents the specific choice set. V_{ijt} represents the choice utility a participant "*j*" attributes to a food product within a choice set "t", α_1, α_2 and α_2 represent a participant's preference weights attributing to the price of a specific food product. ε_{1ijt}, ε_{2ijt}, and ε_{3ijt} represent the random term attributing to the unobserved components and uncertainty that influence choices, which are assumed to follow an independent and identical distribution. $\beta_{1.1}$- $\beta_{1.6}$, $\beta_{2.1}$- $\beta_{1.6}$, and $\beta_{3.1}$- $\beta_{3.6}$ represent the utility coefficients (preference weights) an individual attribute to specific attributes (other than price) when choosing a specific food product. A *p*-value of <0.05 for the utility coefficient indicates that changing the level of that specific attribute would significantly change participants' preferences for foods.

MLM was first run to estimate a mean and a standard deviation of each utility coefficient assumed to be normally distributed with heterogeneity covariance set to be uncorrelated. If the standard deviation of the utility coefficient for a specific attribute is not statistically significant, that utility coefficient is fixed to re-run the model. This was done to improve the simplicity of the model and improve efficiency in parameter estimates. The MLM was run with multi-start search which set the "numMultiStarts" to 10. This will enable running the optimization multiple times from different starting values.

The main effect of each attribute on food choices without considering the goal priming would be severed as a basis for interpreting the effects of goal priming. To examine the effects of goal priming, we first created a dummy variable to represent each priming condition. Then, an interaction term between each priming condition and each food attribute was created. This created a total of 21 interaction terms. We observed a relatively high correlation ($r > 0.6$) between the interaction term of the priming condition with price (continuous variables) and those of the same priming condition with other dichotomized attributes. To avoid potential collinearity problems and reduce number parameter estimates in one single model, upon testing the main effects of all food attributes, the two sets of interaction terms (goal priming with price and goal priming with other dichotomized food attributes) were additionally but separately included in the MLM.

To test H2, which examines whether goal priming on preferences for foods with an "eco-friendly" label would be modified by participants' social orientation values, we first created six three-way interaction terms, each representing one interaction of one priming condition (dummy variable) with the "eco-friendly" attribute (present vs. absent) and self-enhancement/self-transcendence values (mean scores). Then, for each food category, a mixed logit model was run to examine the effects of these six three-way interactions in addition to the main effects of food attributes on participants' food choices. All data analyses were conducted using R version 4.3.1.

4. Results

In this section, the overall importance pattern of the selected attributes on determining food choices is first outlined, followed by presenting the effects of goal priming on the importance of the eco-friendly label and other food attributes on food choices. Then, the modification effects of social orientation values on the effectiveness of different goal priming in promoting preferences for eco-friendly labelled foods are reported.

4.1. The effects of an eco-friendly label and goal priming

The results of the main models without including the interactions of goal priming with food attributes were shown in Table 2. It shows that across all three food categories, among the selected dichotomous food attributes, the importance of "eco-friendly" was comparable to that of "organic" but greater than that of other sustainability attributes in impacting participants' food choices (Table 2). Specifically, participants preferred meat products that were labelled as "organic", "eco-friendly", "local", and "natural", vegetables labelled as "eco-friendly", "organic", "in-season", and "local", and dairy products labelled as "eco-friendly", "organic", "local", and "natural". "Hormone-free" for meat products, "Packaged" for vegetables, and "GMO-free" for dairy products were not significant predictors. For all three food categories, participants preferred products that were rated to have better taste experiences and had lower prices.

Table 2
Preference weights of attributes in determining food choice by food category ($N = 956$).

Attribute by food category[#]	Preference weight/standard deviation (95 % CI)	Standard Error	*p*
Meat products			
"Eco-friendly"	1.614 (1.365, 1.868)	0.129	<0.001
"Organic"	1.755 (1.518, 1.995)	0.122	<0.001
"Local"	0.134 (0.018, 0.248)	0.059	0.023
"Natural"	0.872 (0.735, 1.010)	0.070	<0.001
"Hormone-free"	−0.133 (−0.417, 0.157)	0.145	0.362
Better taste	0.724 (0.574, 0.873)	0.076	<0.001
Price	−0.066 (−0.072, −0.060)	0.003	<0.001
sd. "Eco-friendly"	1.642 (1.401, 1.876)	0.122	<0.001
sd. "Organic"	−1.561 (−1.795, −1.325)	0.119	<0.001
sd. "Hormone-free"	−1.988 (−2.372, −1.592)	0.199	<0.001
sd. "Better taste"	−1.453 (0.571–0.875)	0.097	<0.001
Vegetable products			
"Eco-friendly"	1.260 (1.164, 1.357)	0.050	<0.001
"Organic"	1.257 (1.134, 1.377)	0.063	<0.001
"Local"	0.298 (0.202, 0.395)	0.049	<0.001
"In-season"	0.305 (0.198, 0.416)	0.056	<0.001
"Packaged"	0.022 (−0.069, 0.114)	0.047	0.640
Better taste	0.363 (0.232, 0.497)	0.068	<0.001
Price	−0.094 (−0.101, −0.088)	0.003	<0.001
sd. "Eco-friendly"	0.294 (0.081, 0.516)	0.111	0.008
sd. "Organic"	−0.321 (−0.577, −0.069)	0.128	0.012
sd. "Local"	−0.429 (−0.583, −0.272)	0.079	<0.001
sd. "Packaged"	0.343 (0.156, 0.552)	0.106	0.001
sd. "Better taste"	−1.241 (−1.436, −1.042)	0.101	<0.001
Dairy products			
"Eco-friendly"	1.197 (1.033, 1.359)	0.083	<0.001
"Organic"	0.764 (0.441, 1.088)	0.166	<0.001
"Local"	0.525 (0.382, 0.668)	0.074	<0.001
"GMO-free"	−0.342 (−0.749, 0.068)	0.210	0.104
"Natural"	0.346 (0.056, 0.643)	0.150	0.021
Better taste	0.661 (0.560, 0.759)	0.051	<0.001
Price	−0.079 (−0.087, −0.072)	0.004	<0.001
sd. "Eco-friendly"	0.847 (0.683, 0.010)	0.084	<0.001
sd. "Organic"	0.553 (0.371, 0.737)	0.093	<0.001
sd. "Natural"	0.216 (0.016, 0.420)	0.104	0.038
sd. "Better taste"	−0.945 (−1.073, −0.818)	0.064	<0.001

[#] All attributes other than price were treated as dichotomous variables while price was treated as continuous variables in the models. The models were run with the whole sample. sd: Standard Deviation.

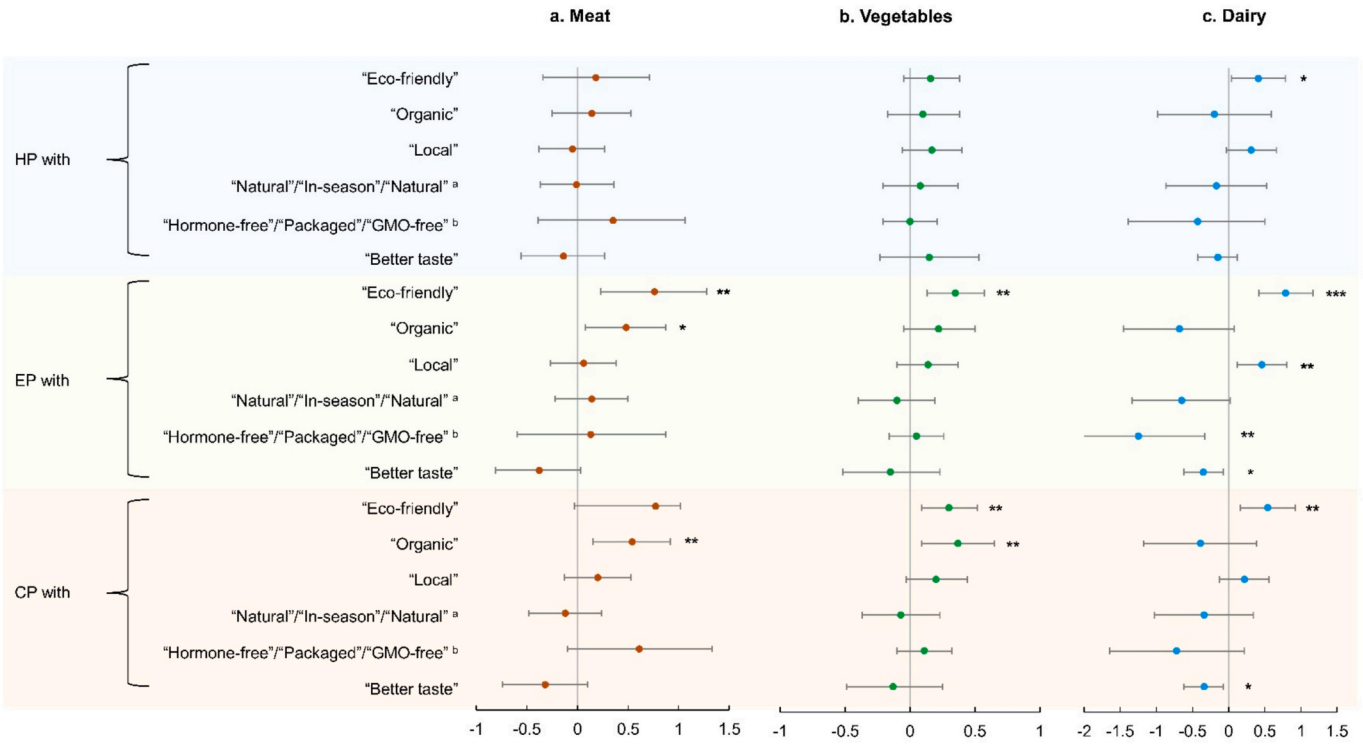

Fig. 2. The priming effects on the importance of different food attributes in impacting food choices across meat, vegetables, and dairy products
Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; HP, Health-benefit priming; EP, Environmental-benefit priming; CP, Co-benefit priming. [a] The attribute refers "natural" for meat or dairy products but "in-season" for vegetable products; [b] The attribute refers to "hormone-free" for meat products, "packaged" for vegetable products, and "GMO-free" for dairy products. Error bars represent the 95 % confidence intervals of the priming effects on food attributes. The interaction effects of priming conditions with price were shown in Fig. 3.

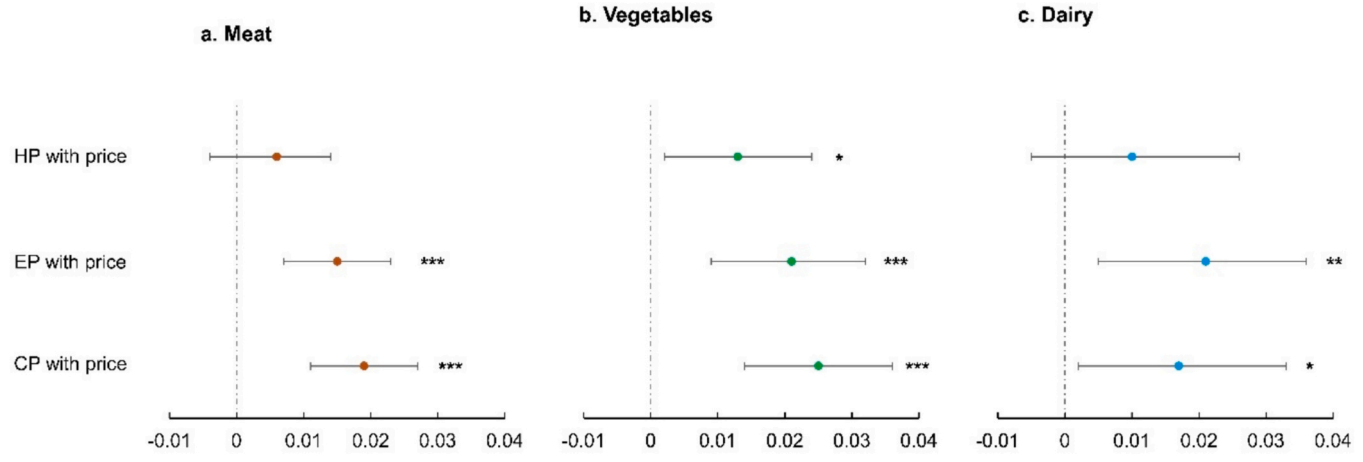

Fig. 3. The effects of goal priming on the importance of prices in impacting preferences for meat, vegetables, and dairy products
Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; HP, Health-benefit priming; EP, Environmental-benefit priming; CP, Co-benefit priming. Error bars represent the 95 % confidence intervals of the priming effects on prices.

The results of models that additionally include the interactions of goal priming with food attributes to test the priming effects are provided in Table S2-S4, Supplementary Material. Fig. 2 and Fig. 3 were provided to better illustrate the effects of goal priming on the importance of each food attribute in impacting food choices across the three food categories. As shown in Fig. 2, HP did not change the importance of any food attributes except for a positive effect on participants' preferences for dairy products with an "eco-friendly" label. In comparison, EP consistently increased participants' preferences for foods with an "eco-friendly" label across all three food categories, meat products with an "organic" label, and dairy products with a "local" claim. Intriguingly, EP increased participants' aversion to dairy products with a "GMO-free" label. CP increased participants' preferences for vegetable and dairy products with an "eco-friendly" label but the effect on preferences for meat products with an "eco-friendly" label was not statistically significant. In addition, CP increased participants' preferences for meat and vegetable products with an "organic" label. Both EP and CP, but not HP, reduced the importance of taste preference in impacting choices of dairy products.

Since the preference weight of price on food choices was negative

across the three food categories, the positive interactions between priming conditions and price indicate that the goal priming reduces participants' sensitivity to the increase in food prices in deciding food choices. As shown in Fig. 3, HP only reduced the importance of prices in impacting preferences for vegetables, while both EP and CP reduced the importance of prices in impacting food choices in all three categories.

4.2. The modification effects of social orientation values on the goal priming effects

The full results of the models testing whether the effects of goal priming on preferences for foods with an "eco-friendly" label would be modified by social orientation values are provided in Table S5, Supplementary Material. For a better illustration, only the effects of the six three-way interactions that represent the modifications effects of social orientation values and their 95 % confidence intervals across the three food categories are shown in Fig. 4. Across food categories, the effects of the three goal priming conditions on the importance of "eco-friendly" was lower for participants with higher self-enhancement values but higher for those with higher self-transcendence values. The modification of both self-enhance and self-transcendence values on the effects of HP was smaller than on the effects of EP and CP.

5. Discussion

In this section, the effects of different attributes on food choices are first discussed, which serves as a foundation for subsequent discussion about the goal priming effects on the importance of these attributes, especially eco-friendly labelling, for impacting food choices. This is followed by discussion about the influences of social orientation values on the goal priming effects and the study limitations.

5.1. The effects of different attributes in impacting food choices

This study demonstrated that an eco-friendly label consistently increased participants' preferences for meat, vegetables, and dairy products, representing an important attribute that impacting food choices. The "eco-friendly" label indicates "fewer natural resources consumed and carbon emissions" in our study and thereby refers to a more holistic indicator of the environmental impact of foods. This finding indicates that consumers value the environmental friendliness of foods (Tobi et al., 2019). The organic attribute had a comparable effect on food choices as "eco-friendly" in the current study. Existing literature indicates that consumers have a better understanding of organic certification and are more familiar with the organic labels than with other sustainability labels (Annunziata et al., 2019). However, consumers' intention to buy organic foods was mainly driven by the perception that organic foods are healthier and safer rather than environmental concern (Iqbal et al., 2021; Schleenbecker and Hamm, 2013). Especially, organic certification can offer reassurance of safety for meat products (Van Loo et al., 2010), a major consumer concern in Asia, owing to the repeated emergence of novel respiratory infectious disease viruses such as avian influenza and novel coronary viruses from animal markets (Fielding and Lam, 2007; Indrawan et al., 2018).

The "local" production claims were consistently found to increase the preferences for food products in all three categories. For vegetable produce, a "local" claim was as important as the "in-season" claim, while plastic packaging was not a significant attribute associated with preferences for vegetable produce in the current study. Previous research indicates that participants prefer sustainable packaging of foods over plastic packaging that is not recyclable (Herrmann et al., 2022). The insignificant effects of packaging in our study would be due to the lower salience of the attribute which fails to capture participants' attention in the choice tasks or that the impact of plastic packaging is overlooked when making food choices (Otto et al., 2021; Tobler et al., 2011).

The "Natural" claim was another attribute that increased consumers' preference for meat but not dairy products. Previous qualitative research has indicated that consumers were confused about the natural claims on meat products and perceived that the natural claims tended to couple with other food claims such as "antibiotic-free", "hormone-free", and "organic" (Abrams et al., 2010). A natural claim can trigger the use of the "natural-is-better" heuristic which increases consumers' perceived safety of the product and sensory experiences (Simão et al., 2022). In comparison, perceived "unnatural" was an important factor for rejecting meat substitute products (Hartmann et al., 2022). Although the "natural" claims for meat products are appealing for consumers, an official

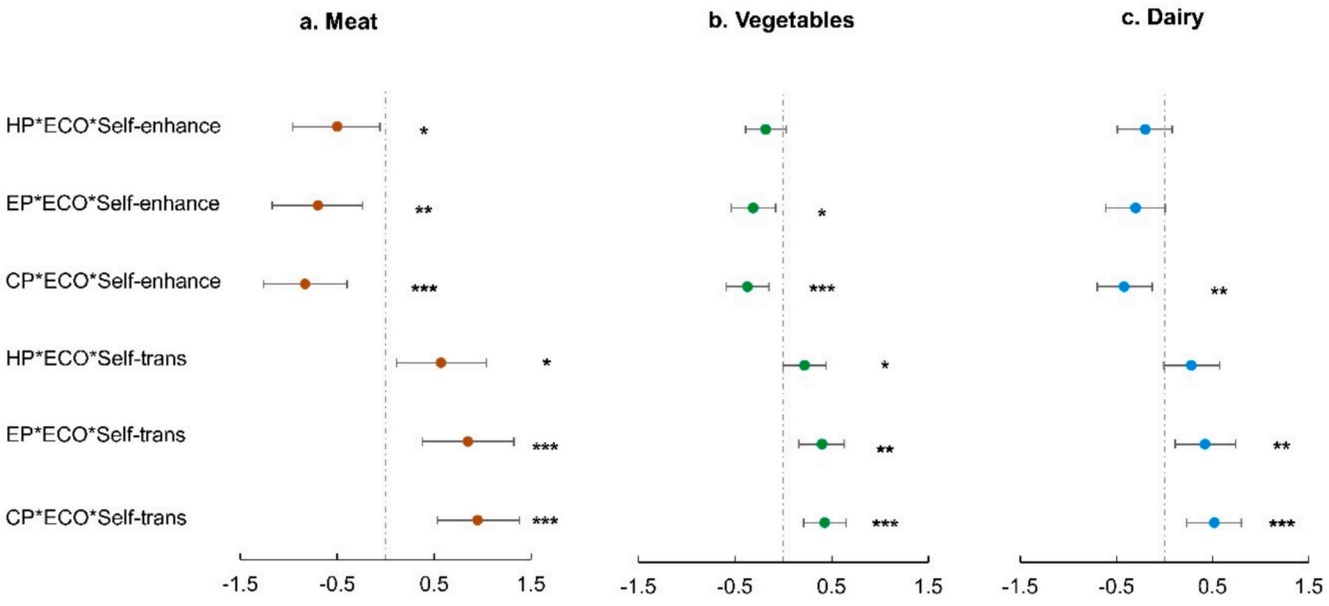

Fig. 4. The Modification effects of social orientation values on the effects of priming on the importance of the "eco-friendly" attribute in determining food choices across the three food categories

Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; HP, Health-benefit priming; EP, Environmental-benefit priming; CP, Co-benefit priming; ECO, "eco-friendly" attribute; Self-enhance, Self-enhancement values; Self-trans, Self-transcendence values. Error bars represent the 95 % confidence intervals of the effects.

and explicit definition of "natural" on meat including poultry is lacking, which calls for stricter regulations to oversight the use of "natural" claims (Hooker et al., 2018). The insignificant impact of the "natural" claims on preferences for dairy products deserves attention. A systematic review indicated that consumers generally have high acceptance and preference for dairy products that are nutrition-modified and functional such as those with added calcium and fiber or with reduced fat (Bimbo et al., 2017). Hence, although "natural" dairy products may be considered more environmentally friendly and safer, they may also be perceived as having a lower nutritional function, causing a mixed effect on consumers' preferences.

Although previous studies reported that people favored foods that were framed to be absent from "negative" attributes including "hormone-free" and "GMO-free" (Eiseman, 2008; Finucane and Holup, 2005; Salnikova and Stanton, 2021), the "hormone-free" claims for meat products and "GMO-free" claims for dairy products in the current study did not affect food preferences. One possible reason could be that negative-framed attributes (e.g. absence of negative ingredients) are less salient than positive-framed attributes (e.g. presence of positive ingredients) in this decision context, but this awaits further testing. Another reason could be due to a mixture of positive, neutral, and negative attitudes towards GMO foods among Chinese consumers (Cui and Shoemaker, 2018). Furthermore, taste preference was found to be less important than "organic" and "eco-friendly" but more important than other sustainability attributes included in this DCE, for impacting food preferences across the three food categories. This indicates that consumers value health and environmental friendliness more than taste experiences when the "organic" labels and "eco-friendly" labels are made salient for them. Another possible explanation may be that our study mainly included raw foods for which the reward of taste is more distant compared with ready-to-eat foods for the decision makers. Hence, the findings may not be applicable to foods with immediate rewards such as snacks, but this awaits further testing.

5.2. The effects of goal priming on the importance of different attributes for food choices

We used a word-searching task as the priming intervention to stimulate participants' mental associations of dietary choices with the goals of health benefits, environmental benefits, and co-benefits, respectively. Our intervention is more engaging than merely sending relevant messages to participants because it requires participants to actively pay attention to relevant statements among the available options. Meanwhile, our intervention was relatively unobtrusive, compared to, for example persuasive messages, to change participants' attitudes and behaviours. Importantly, we did not directly link the word-searching task to the food choice tasks.

It was found that while HP only increased participants' preferences for dairy products with an "eco-friendly" label, both EP and CP consistently increased participants' preferences for foods with an "eco-friendly" label in all three categories. Additionally, both EP and CP increased participants' preferences for meat and vegetable products with an "organic" label. The lack of significant impact of HP on preferences for meat or vegetable products labelled as eco-friendly may be attributed to the minimal variation in healthiness between products of either the meat or vegetable category, despite existing literature indicating that organic foods tend to be perceived as healthier (Iqbal et al., 2021; Schleenbecker and Hamm, 2013). In addition to the goal of health, EP and CP may also activate consumers' goal of environmental sustainability for choosing organic foods (Tate et al., 2014). Hence, the importance attached to the "organic" attribute increased. Intriguingly, EP also increased consumers' preferences for "local" dairy products and aversion to dairy products that were labelled as "GMO-free". This indicates that EP has activated consumers' mental association between local production and environmental sustainability, which increased the importance of "local" claims for dairy products.

The impact of EP on aversion to "GMO-free" dairy products was unexpected. Existing literature indicates that consumers generally have negative attitudes towards GM primarily due to feeling uncertain about the health and safety of GM foods, especially among European consumers (Bawa and Anilakumar, 2013; Finucane and Holup, 2005). However, recent evidence suggests that concern about GMOs has declined from 66 % in 2010 to 27 % in 2019 among European citizens (European Food Safety Authority, 2019). In Hong Kong, although 56 % of the adult population perceived GM to be potentially harmful, 41 % perceived GM to be hopeful or neutral (Levi, 2022). While concerned about the safety of GM foods, consumers did perceive some environmental benefits of using GM in food production, such as less pesticide use (Popek and Halagarda, 2017). The EP may have activated participants' goal of environmental benefits in food choices and hence reduced preferences for GMO-free foods.

Furthermore, both EP and CP were found to reduce the importance of taste preference in impacting preferences for dairy products, and participants' sensitivity to the increases in food prices in all three categories. In comparison, HP did not change the importance of taste preference and merely had a smaller effect on reducing participants' sensitivity to the increases in the prices of vegetable produce.

Taking together, our first hypothesis was overall supported, but EP and CP were more effective in increasing the importance of environmental sustainability attributes, and reducing the importance of taste preference and prices than HP. Our priming strategies, that focus on activating or creating associations between dietary choices and specific health, environmental sustainability, or combined goals, are likely to increase the salience of attributes that are aligned with the primed goal or increase participants' preferences for foods with those attributes. A systematic review indicates that food health labelling when combined with strategies to increase the salience of the labels can generate stronger effects on promoting health food choices compared with labelling alone (Wilson et al., 2016). The findings of our study indicate similar evidence in the context of sustainable food choices. In addition, due to their relative unobtrusiveness, our priming strategies are likely more acceptable, and encounter less psychological resistance compared with education-based interventions for promoting sustainable food choices.

5.3. The modification effects of social orientation values on the effects of goal priming

We found that EP was less effective for participants with higher self-enhancement values and more effective for participants with higher self-transcendence values in improving their preferences for foods with an eco-friendly logo. This indicates that EP, which activates a prosocial goal of better environments, is more effective for individuals with higher prosocial values, but less promising for individuals who prioritize egoistic goals such as personal wealth, power and materialism. However, our initial hypothesis that HP and CP, both involving priming for the goal of personal health, would be more effective for participants with higher self-enhancement values in improving their preferences for eco-friendly-labelled foods was not supported. Instead, like EP, both HP and CP were less effective for participants with higher self-enhancement values but more promising for those with higher self-transcendence values. The initial hypothesis was based on the speculation that personal health is considered as an egoistic goal that together with price and taste preference classifies an individual as "pro-self" or self-focused (Verain et al., 2017). However, there is evidence that consumers tend to perceive food healthiness as incongruent with taste preference and price (Haws et al., 2017; Irmak et al., 2011; Raghunathan et al., 2006). That is, healthy food is perceived to be less tasty and more expensive. Hence, HP may encounter psychological resistance particularly for consumers who prioritize other short-term and hedonic egoistic goals. There is also evidence that self-transcendence values are positively associated with long-term interests (e.g. health) (Olsen and Tuu, 2021) and that

activating a person's self-transcendence values can increase perceived self-relevance of health messages (Kang et al., 2018). All these indicate that health-benefit priming, though denoting a more personal goal, is aligned with participants' self-transcendence values rather than self-enhancement values. This may explain why HP and CP, like EP, were more promising for participants with higher self-transcendence values. Future studies should consider priming for more egoistic and immediate goals of sustainable diets such as taste and enjoyment of eating (Papies et al., 2020b) to attract consumers with high self-enhancement values.

5.4. Limitations

Our study had several limitations. First, as a DCE study, the food choice outcomes in our study were hypothetical. Therefore, it remains unknown how factors such as participants' desire for eating, peer influence, and the real food choice environment would affect the importance of attributes included in the current study. Second, our DCE was designed followed the traditional orthogonal factorial methods with which the number of choice tasks generated was smaller than the number of parameter estimates using MLM. This may cause efficiency loss for the parameter estimates especially the standard deviation estimates (Rose and Bliemer, 2013). Although previous research indicates that an orthogonal design for data at an early stage should not prohibit the use of more advanced models such as mixed logit models at a later stage if the data work well with these models (Bliemer and Rose, 2010), future studies should using efficiency design to improve the statistical efficiency and the reliability of parameter estimates (Lizin et al., 2022). Third, this DCE represents a classic stated preference experiment that requires participants to choose one food product from two alternatives in each choice set. The omission of the no-choice option in our choice sets may not accurately reflect real-life situation and introduce hypothetical bias (Murphy et al., 2005), though a simulation study indicates that adding the no-choice option does not significantly increase the estimation precision (Vermeulen et al., 2008). Fourth, the greater importance of the eco-friendly and organic labels for impacting food choices may be attributed to the greater visual attention to these two attributes (Drexler et al., 2018). In comparison, other attributes such as the plastic packaging and text-based attributes were less salient, which may cause attribute non-attendance that not all attributes are used for making decisions (Scarpa et al., 2009). Previous research suggests that attribute non-attendance may reflect preferences rather than decision heuristics particularly when participants are familiar with the attributes being presented (Heidenreich et al., 2018). That is, the attributes ignored are those considered less important by the decision makers. However, the potential for heuristic biases and the problem of attribute non-attendance remains a concern due to variations in format and salience of different attributes in the study. Furthermore, the finding that the effect of sustainability logos was enhanced by environmental primes and transcendental values was in line with our theoretically motivated and predictions and cannot be explained by visual salience alone. Fifth, in the DCE tasks, all food choices are made online, and thereby the findings may not be applicable to contexts when food products are tangible. In addition, by restricting participants to select foods within the same category rather than between meat-based and plant-based options, our study cannot determine the impact of the priming interventions on shifting preferences towards plant-based foods over meat-based foods. Despites these limitations, our study is one of the few registered randomized control trials that tested and compared the effects of three goal priming for promoting sustainable food choices. The findings are valuable for future interventions to promote sustainable food production and consumption.

6. Conclusions

The combined effects of goal priming and eco-friendly labelling of foods for promoting sustainable food choices were evidenced. Priming for environmental benefits or the co-benefits for health and the environment of sustainability diets compared with merely health-benefit priming had stronger effects on increasing the importance of “eco-friendly” and “organic” attributes and reducing the importance of taste preference and food price, in impacting food choices. This highlights the importance of linking sustainable food choices to positive environmental changes, such as mitigating climate change, for transforming sustainable food choices. Goal priming can be an easily implemented strategy to enhance the salience of sustainability labels and thereby facilitates consumers' utilization of these labels when making sustainable food choices. Such strategy can be used by the food manufacturers and catering service providers to promote their food products that are more environmentally sustainable. However, priming with the goals of better health and environment had more promising effects on consumers with higher transcendence values but was less effective for consumers with higher self-enhancement values. Future studies should test priming interventions that activate the immediate benefits of sustainable food choices, such as eating enjoyment, for consumers who prioritize hedonic goals.

CRediT authorship contribution statement

Qiuyan Liao: Writing – original draft, Visualization, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Esther K. Papies:** Writing – review & editing, Methodology. **Yuyi Chen:** Visualization, Project administration, Methodology, Investigation. **Meijun Chen:** Writing – review & editing, Data curation. **Meihong Dong:** Writing – review & editing, Visualization, Methodology. **Wendy Wing Tak Lam:** Writing – review & editing, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could be perceived as having influenced the work described in this paper.

Acknowledgements

This work was supported by the Hong Kong Research Grants Council's General Research Fund (Project No. 17618820). The sponsor was not involved in study design, in the collection, analysis, and interpretation of data, in the writing of the report, or in the decision to submit the article for publication.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.spc.2025.04.021.

References

Abrams, K.M., Meyers, C.A., Irani, T.A., 2010. Naturally confused: consumers' perceptions of all-natural and organic pork products. Agric. Hum. Values 27 (3), 365–374. https://doi.org/10.1007/s10460-009-9234-5.

Annunziata, A., Mariani, A., Vecchio, R., 2019. AnalysSustainable Production and Consumptionis of visibility and understanding among young adults. In: Effectiveness of sustainability labels in guiding food choices, 17, pp. 108–115. https://doi.org/10.1016/j.spc.2018.09.005.

Bastounis, A., Buckell, J., Hartmann-Boyce, J., Cook, B., King, S., Potter, C., et al., 2021. The impact of environmental sustainability labels on willingness-to-pay for foods: a systematic review and meta-analysis of discrete choice experiments. Nutrients 13 (8). https://doi.org/10.3390/nu13082677.

Bawa, A.S., Anilakumar, K.R., 2013. Genetically modified foods: safety, risks and public concerns—a review. J. Food Sci. Technol. 50 (6), 1035–1046. https://doi.org/10.1007/s13197-012-0899-1.

Berry, C., Burton, S., Howlett, E., 2017. It's only natural: the mediating impact of consumers' attribute inferences on the relationships between product claims, perceived product healthfulness, and purchase intentions. J. Acad. Mark. Sci. 45 (5), 698–719. https://doi.org/10.1007/s11747-016-0511-8.

Bimbo, F., Bonanno, A., Nocella, G., Viscecchia, R., Nardone, G., De Devitiis, B., et al., 2017. Consumers' acceptance and preferences for nutrition-modified and functional dairy products: a systematic review. Appetite 113, 141–154. https://doi.org/10.1016/j.appet.2017.02.031.

Birkenbach, M., Egloff, B., 2024. Effects of matching climate change appeals to personal values. Sci. Rep. 14 (1), 6128. https://doi.org/10.1038/s41598-024-56631-z.

Bliemer, M.C.J., Rose, J.M., 2010. Construction of experimental designs for mixed logit models allowing for correlation across choice observations. Transp. Res. B Methodol. 44 (6), 720–734. https://doi.org/10.1016/j.trb.2009.12.004.

Boland, W.A., Connell, P.M., Vallen, B., 2013. Time of day effects on the regulation of food consumption after activation of health goals. Appetite 70, 47–52. https://doi.org/10.1016/j.appet.2013.06.085.

Brown, K.A., Harris, F., Potter, C., Knai, C., 2020. The future of environmental sustainability labelling on food products. The Lancet Planetary Health 4 (4), e137–e138. https://doi.org/10.1016/S2542-5196(20)30074-7.

Capper, J.L., 2011. The environmental impact of beef production in the United States: 1977 compared with 2007. J. Anim. Sci. 89 (12), 4249–4261. https://doi.org/10.2527/jas.2010-3784.

Carfora, V., Catellani, P., Caso, D., Conner, M., 2019. How to reduce red and processed meat consumption by daily text messages targeting environment or health benefits. J. Environ. Psychol. 65, 101319. https://doi.org/10.1016/j.jenvp.2019.101319.

Carrico, A.R., Raimi, K.T., Truelove, H.B., Eby, B., 2017. Putting your money where your mouth is: an experimental test of pro-environmental spillover from reducing meat consumption to monetary donations. Environ. Behav. 50 (7), 723–748. https://doi.org/10.1177/0013916517713067.

Clark, M.A., Domingo, N.G.G., Colgan, K., Thakrar, S.K., Tilman, D., Lynch, J., et al., 2020. Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets. Science 370 (6517), 705–708. https://doi.org/10.1126/science.aba7357.

Corner, A., Markowitz, E., Pidgeon, N., 2014. Public engagement with climate change: the role of human values. WIREs Climate Change 5 (3), 411–422. https://doi.org/10.1002/wcc.269.

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F.N., Leip, A., 2021. Food systems are responsible for a third of global anthropogenic GHG emissions. Nature Food 2 (3), 198–209. https://doi.org/10.1038/s43016-021-00225-9.

Cui, K., Shoemaker, S.P., 2018. Public perception of genetically-modified (GM) food: a Nationwide Chinese consumer study. npj Science of Food 2 (1), 10. https://doi.org/10.1038/s41538-018-0018-4.

Czarnezki, J. J. (2011). The future of food eco-labeling: organic, carbon footprint, and environmental life-cycle analysis. Retrieved from http://digitalcommons.pace.edu/lawfaculty/914/. Retrieved 10 November 2024, from Vermont law school.

de Bekker-Grob, E.W., Donkers, B., Jonker, M.F., Stolk, E.A., 2015. Sample size requirements for discrete-choice experiments in healthcare: a practical guide. The Patient - Patient-Centered Outcomes Research 8 (5), 373–384. https://doi.org/10.1007/s40271-015-0118-z.

Drexler, D., Fiala, J., Havlíčková, A., Potůčková, A., Souček, M., 2018. The effect of organic food labels on consumer attention. J. Food Prod. Mark. 24 (4), 441–455. https://doi.org/10.1080/10454446.2017.1311815.

Eiseman, K., 2008. Chapter 13. Food labeling: Free trade, consumer choice, and accountability. In: Reconciling Environment and Trade. Brill | Nijhoff, Leiden, The Netherlands, pp. 377–405.

Engeser, S., Wendland, M., Rheinberg, F., 2006. Nonconscious activation of behavioral goals, a methodologically refined replication. Psychol. Rep. 99 (3), 963–970. https://doi.org/10.2466/PR0.99.3.963-970.

European Food Safety Authority. (2019). Special Eurobarometer wave EB91.3: food safety in the EU. Accessed on 25 June 2024. Retrieved from https://www.efsa.europa.eu/sites/default/files/corporate_publications/files/Eurobarometer2019_Food-safety-in-the-EU_Full-report.pdf.

Fielding, R., Lam, W.W.T., 2007. Reducing avian influenza risk: a qualitative exploration of issues in Hong Kong. Health Educ. 107 (5), 437–447. https://doi.org/10.1108/09654280710778574.

Finucane, M.L., Holup, J.L., 2005. Psychosocial and cultural factors affecting the perceived risk of genetically modified food: an overview of the literature. Soc. Sci. Med. 60 (7), 1603–1612. https://doi.org/10.1016/j.socscimed.2004.08.007.

Foley, J.A., Ramankutty, N., Brauman, K.A., Cassidy, E.S., Gerber, J.S., Johnston, M., et al., 2011. Solutions for a cultivated planet. Nature 478 (7369), 337–342. https://doi.org/10.1038/nature10452.

Fox, E.L., Davis, C., Downs, S.M., McLaren, R., Fanzo, J., 2021. A focused ethnographic study on the role of health and sustainability in food choice decisions. Appetite 165, 105319. https://doi.org/10.1016/j.appet.2021.105319.

Gao, J., Kovats, S., Vardoulakis, S., Wilkinson, P., Woodward, A., Li, J., et al., 2018. Public health co-benefits of greenhouse gas emissions reduction: a systematic review. Sci. Total Environ. 627, 388–402. https://doi.org/10.1016/j.scitotenv.2018.01.193.

Gracia, A., 2014. Consumers' preferences for a local food product: a real choice experiment. Empir. Econ. 47 (1), 111–128. https://doi.org/10.1007/s00181-013-0738-x.

Graham, T., Abrahamse, W., 2017. Communicating the climate impacts of meat consumption: the effect of values and message framing. Glob. Environ. Chang. 44, 98–108. https://doi.org/10.1016/j.gloenvcha.2017.03.004.

Gynell, I., Kemps, E., Prichard, I., 2022. The effectiveness of implicit interventions in food menus to promote healthier eating behaviours: a systematic review. Appetite 173, 105997. https://doi.org/10.1016/j.appet.2022.105997.

Hartmann, C., Furtwaengler, P., Siegrist, M., 2022. Consumers' evaluation of the environmental friendliness, healthiness and naturalness of meat, meat substitutes, and other protein-rich foods. Food Quality and Preference 97, 104486. https://doi.org/10.1016/j.foodqual.2021.104486.

Hauber, A.B., González, J.M., Groothuis-Oudshoorn, C.G.M., Prior, T., Marshall, D.A., Cunningham, C., et al., 2016. Statistical methods for the analysis of discrete choice experiments: a report of the ISPOR conjoint analysis good research practices task force. Value Health 19 (4), 300–315. https://doi.org/10.1016/j.jval.2016.04.004.

Haws, K.L., Reczek, R.W., Sample, K.L., 2017. Healthy diets make empty wallets: the healthy = expensive intuition. J. Consum. Res. 43 (6), 992–1007. https://doi.org/10.1093/jcr/ucw078.

Heidenreich, S., Watson, V., Ryan, M., Phimister, E., 2018. Decision heuristic or preference? Attribute non-attendance in discrete choice problems. Health Econ. 27 (1), 157–171. https://doi.org/10.1002/hec.3524.

Helveston, J.P., 2023. Logitr: fast estimation ofmultinomial and mixed logit models with preference space and willingness-to-pay sapce utility parameterizatins. J. Stat. Softw. 105 (10), 1–37. https://doi.org/10.18637/jss.v105.i10.

Henson, R.N.A., 2003. Neuroimaging studies of priming. Prog. Neurobiol. 70 (1), 53–81. https://doi.org/10.1016/S0301-0082(03)00086-8.

Herrmann, C., Rhein, S., Sträter, K.F., 2022. Consumers' sustainability-related perception of and willingness-to-pay for food packaging alternatives. Resour. Conserv. Recycl. 181, 106219. https://doi.org/10.1016/j.resconrec.2022.106219.

Hoek, A.C., Pearson, D., James, S.W., Lawrence, M.A., Friel, S., 2017. Healthy and environmentally sustainable food choices: consumer responses to point-of-purchase actions. Food Quality and Preference 58, 94–106. https://doi.org/10.1016/j.foodqual.2016.12.008.

Hooker, N., Simons, C. T., & Parasidis, E. (2018). "Natural" food claims: industry practices, consumer expectations, and class action lawsuits. Food Drug Law J., 73(2), 319–337. Retrieved from https://www-jstor-org.eproxy.lib.hku.hk/stable/26661179.

Hoyos, D., 2010. The state of the art of environmental valuation with discrete choice experiments. Ecol. Econ. 69 (8), 1595–1603. https://doi.org/10.1016/j.ecolecon.2010.04.011.

Indrawan, D., Tacken, G., Hogeveen, H., 2018. What drives the choice of poultry market channel and the change of purchase behavior due to highly pathogenic avian influenza outbreaks? Poult. Sci. 97 (10), 3652–3660. https://doi.org/10.3382/ps/pey222.

Iqbal, J., Yu, D., Zubair, M., Rasheed, M.I., Khizar, H.M.U., Imran, M., 2021. Health consciousness, food safety concern, and consumer purchase intentions toward organic food: the role of consumer involvement and ecological motives. SAGE Open 11 (2). https://doi.org/10.1177/21582440211015727, 21582440211015727.

Irmak, C., Vallen, B., Robinson, S.R., 2011. The impact of product name on dieters' and nondieters' food evaluations and consumption. J. Consum. Res. 38 (2), 390–405. https://doi.org/10.1086/660044.

Janßen, D., Langen, N., 2017. The bunch of sustainability labels – do consumers differentiate? J. Clean. Prod. 143, 1233–1245. https://doi.org/10.1016/j.jclepro.2016.11.171.

Kang, Y., Cooper, N., Pandey, P., Scholz, C., O'Donnell, M.B., Lieberman, M.D., et al., 2018. Effects of self-transcendence on neural responses to persuasive messages and health behavior change. Proc. Natl. Acad. Sci. 115 (40), 9974–9979. https://doi.org/10.1073/pnas.1805573115.

Karlsson, M., Alfredsson, E., Westling, N., 2020. Climate policy co-benefits: a review. Clim. Pol. 20 (3), 292–316. https://doi.org/10.1080/14693062.2020.1724070.

Krystallis, A., Vassallo, M., Chryssohoidis, G., Perrea, T., 2008. Societal and individualistic drivers as predictors of organic purchasing revealed through a portrait value questionnaire (PVQ)-based inventory. J. Consum. Behav. 7 (2), 164–187. https://doi.org/10.1002/cb.244.

Lagerkvist, C.J., Edenbrandt, A.K., Bolos, L.A., Nayga, R.M., 2023. Consumer acceptance of aesthetically imperfect vegetables – the role of information framing and personal values: evidence from the United States. Food Quality and Preference 104, 104737. https://doi.org/10.1016/j.foodqual.2022.104737.

Lazzarini, G.A., Visschers, V.H.M., Siegrist, M., 2018. How to improve consumers' environmental sustainability judgements of foods. J. Clean. Prod. 198, 564–574. https://doi.org/10.1016/j.jclepro.2018.07.033.

Leng, G., Adan, R.A.H., Belot, M., Brunstrom, J.M., de Graaf, K., Dickson, S.L., et al., 2017. The determinants of food choice. Proc. Nutr. Soc. 76 (3), 316–327. https://doi.org/10.1017/S002966511600286X.

Levi, S., 2022. Living standards shape individual attitudes on genetically modified food around the world. Food Qual. Prefer. 95, 104371. https://doi.org/10.1016/j.foodqual.2021.104371.

Liberman, N., Trope, Y., 1998. The role of feasibility and desirability considerations in near and distant future decisions: a test of temporal construal theory. J. Pers. Soc. Psychol. 75 (1), 5–18. https://doi.org/10.1037/0022-3514.75.1.5.

Lizin, S., Rousseau, S., Kessels, R., Meulders, M., Pepermans, G., Speelman, S., et al., 2022. The state of the art of discrete choice experiments in food research. Food Quality and Preference 102, 104678. https://doi.org/10.1016/j.foodqual.2022.104678.

Meyerding, S.G.H., Trajer, N., Lehberger, M., 2019. What is local food? The case of consumer preferences for local food labeling of tomatoes in Germany. J. Clean. Prod. 207, 30–43. https://doi.org/10.1016/j.jclepro.2018.09.224.

Murphy, J.J., Allen, P.G., Stevens, T.H., Weatherhead, D., 2005. A meta-analysis of hypothetical bias in stated preference valuation. Environ. Resource Econ. 30 (3), 313–325. https://doi.org/10.1007/s10640-004-3332-z.

Nordlund, A.M., Garvill, J., 2002. Value structures behind proenvironmental behavior. Environ. Behav. 34 (6), 740–756. https://doi.org/10.1177/001391602237244.

Olsen, S.O., Tuu, H.H., 2021. The relationships between core values, food-specific future time perspective and sustainable food consumption. Sustainable Production and Consumption 26, 469–479. https://doi.org/10.1016/j.spc.2020.12.019.

Orme, B., 1998. Sample size issues for conjoint analysis studies. In: In, *Sawtooth Software Technical Paper. Sawtooth Software Technical Paper.* Sequim.
Otto, S., Strenger, M., Maier-Nöth, A., Schmid, M., 2021. Food packaging and sustainability – consumer perception vs. correlated scientific facts: a review. J. Clean. Prod. 298, 126733. https://doi.org/10.1016/j.jclepro.2021.126733.
Papies, E.K., 2016. Health goal priming as a situated intervention tool: how to benefit from nonconscious motivational routes to health behaviour. Health Psychol. Rev. 10 (4), 408–424. https://doi.org/10.1080/17437199.2016.1183506.
Papies, E.K., Barsalou, L.W., 2015. Grounded desire and motivated behavior: A theoretical framework and review of empirical evidence. In: Hofmann, W., Nordgren, L.F. (Eds.), The Psychology of Desire. The Guilford Press, pp. 36–60.
Papies, E.K., Barsalou, L.W., Rusz, D., 2020a. Understanding desire for food and drink: a grounded-cognition approach. Curr. Dir. Psychol. Sci. 29 (2), 193–198. https://doi.org/10.1177/0963721420904958.
Papies, E.K., Hamstra, P., 2010. Goal priming and eating behavior: enhancing self-regulation by environmental cues. Health Psychol. 29 (4), 384–388.
Papies, E.K., Johannes, N., Daneva, T., Semyte, G., Kauhanen, L.-L., 2020b. Using consumption and reward simulations to increase the appeal of plant-based foods. Appetite 155, 104812. https://doi.org/10.1016/j.appet.2020.104812.
Papies, E.K., Veling, H., 2013. Healthy dining. Subtle diet reminders at the point of purchase increase low-calorie food choices among both chronic and current dieters. Appetite 61, 1–7. https://doi.org/10.1016/j.appet.2012.10.025.
Popek, S., Halagarda, M., 2017. Genetically modified foods: consumer awareness, opinions and attitudes in selected EU countries. Int. J. Consum. Stud. 41 (3), 325–332. https://doi.org/10.1111/ijcs.12345.
Potter, C., Bastounis, A., Hartmann-Boyce, J., Stewart, C., Frie, K., Tudor, K., et al., 2021. The effects of environmental sustainability labels on selection, purchase, and consumption of food and drink products: a systematic review. Environ. Behav. 53 (8), 891–925. https://doi.org/10.1177/0013916521995473.
Prieto-Sandoval, V., Mejía-Villa, A., Ormazabal, M., Jaca, C., 2020. Challenges for ecolabeling growth: lessons from the EU ecolabel in Spain. Int. J. Life Cycle Assess. 25 (5), 856–867. https://doi.org/10.1007/s11367-019-01611-z.
Profeta, A., Hamm, U., 2019. Do consumers prefer local animal products produced with local feed? Results from a discrete-choice experiment. Food Quality and Preference 71, 217–227. https://doi.org/10.1016/j.foodqual.2018.07.007.
Prusak, A., Rowe, G., & Strojny, J. (2014). Is GMO "sustainable"? A review ofthe environmental risks of GM plants in comparison with conventional and organic crops. Modern Management Review, 21, 187–200. Retrieved from https://pdfs.semanticscholar.org/a881/04014cc07b606e910a17dbf76e24c8567454.pdf.
Raghunathan, R., Naylor, R.W., Hoyer, W.D., 2006. The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. J. Mark. 70 (4), 170–184. https://doi.org/10.1509/jmkg.70.4.170.
Rose, J.M., Bliemer, M.C.J., 2013. Sample size requirements for stated choice experiments. Transportation 40 (5), 1021–1041. https://doi.org/10.1007/s11116-013-9451-z.
Ryan, M., Bate, A., Eastmond, C.J., Ludbrook, A., 2001. Use of discrete choice experiments to elicit preferences. Qual. Health Care 10 (Suppl. 1), i55. https://doi.org/10.1136/qhc.0100055.
Salnikova, E., Stanton, J.L., 2021. Remove the negatives or highlight the positives? The effect of negativity bias in food preferences. Br. Food J. 123 (7), 2601–2616. https://doi.org/10.1108/BFJ-11-2020-1035.
Scarpa, R., Gilbride, T.J., Campbell, D., Hensher, D.A., 2009. Modelling attribute non-attendance in choice experiments for rural landscape valuation. Eur. Rev. Agric. Econ. 36 (2), 151–174. https://doi.org/10.1093/erae/jbp012.
Schleenbecker, R., Hamm, U., 2013. Consumers' perception of organic product characteristics. A review. Appetite 71, 420–429. https://doi.org/10.1016/j.appet.2013.08.020.
Schwartz, S. H. (2012). An overview of the schwartz theory of basic values. Oneline Readings in Psychology and Culture, 2(1). Retrieved from https://scholarworks.gvsu.edu/orpc/vol2/iss1/11/.
Shreedhar, G., Galizzi, M.M., 2021. Personal or planetary health? Direct, spillover and carryover effects of non-monetary benefits of vegetarian behaviour. J. Environ. Psychol. 78, 101710. https://doi.org/10.1016/j.jenvp.2021.101710.
Simão, S.A.V., Rohden, S.F., Pinto, D.C., 2022. Natural claims and sustainability: the role of perceived efficacy and sensorial expectations. Sustainable Production and Consumption 34, 505–517. https://doi.org/10.1016/j.spc.2022.09.026.
Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: the case of environmentalism. Hum. Ecol. Rev., 6(2), 81–97. Retrieved from http://www.jstor.org/stable/24707060.
Stoessel, F., Juraske, R., Pfister, S., Hellweg, S., 2012. Life cycle inventory and carbon and water foodprint of fruits and vegetables: application to a Swiss retailer. Environ. Sci. Technol. 46 (6), 3253–3262. https://doi.org/10.1021/es2030577.
Tate, K., Stewart, A.J., Daly, M., 2014. Influencing green behaviour through environmental goal priming: the mediating role of automatic evaluation. J. Environ. Psychol. 38, 225–232. https://doi.org/10.1016/j.jenvp.2014.02.004.
Tobi, R.C.A., Harris, F., Rana, R., Brown, K.A., Quaife, M., Green, R., 2019. Sustainable diet dimensions. Comparing consumer preference for nutrition, environmental and social responsibility food labelling: a systematic review. Sustainability 11 (23). https://doi.org/10.3390/su11236575.
Tobler, C., Visschers, V.H.M., Siegrist, M., 2011. Organic tomatoes versus canned beans: how do consumers assess the environmental friendliness of vegetables? Environ. Behav. 43 (5), 591–611. https://doi.org/10.1177/0013916510372865.
Trope, Y., Liberman, N., 2000. Temporal construal and time-dependent changes in preference. J. Pers. Soc. Psychol. 79 (6), 876–889. https://doi.org/10.1037/0022-3514.79.6.876.
Van Loo, E., Caputo, V., Nayga, J.R.M., Meullenet, J.-F., Crandall, P.G., Ricke, S.C., 2010. Effect of organic poultry purchase frequency on consumer attitudes toward organic poultry meat. J. Food Sci. 75 (7), S384–S397. https://doi.org/10.1111/j.1750-3841.2010.01775.x.
Verain, M.C.D., Sijtsema, S.J., Dagevos, H., Antonides, G., 2017. Attribute segmentation and communication effects on healthy and sustainable consumer diet intentions. Sustainability 9 (5). https://doi.org/10.3390/su9050743.
Vermeulen, B., Goos, P., Vandebroek, M., 2008. Models and optimal designs for conjoint choice experiments including a no-choice option. Int. J. Res. Mark. 25 (2), 94–103. https://doi.org/10.1016/j.ijresmar.2007.12.004.
White, A., Lockyer, S., 2020. Removing plastic packaging from fresh produce – what's the impact? Nutr. Bull. 45 (1), 35–50. https://doi.org/10.1111/nbu.12420.
Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., et al., 2019. Food in the anthropocene: the EAT–lancet commission on healthy diets from sustainable food systems. Lancet 393 (10170), 447–492. https://doi.org/10.1016/S0140-6736(18)31788-4.
Wilson, A.L., Buckley, E., Buckley, J.D., Bogomolova, S., 2016. Nudging healthier food and beverage choices through salience and priming. Evidence from a systematic review. Food Quality and Preference 51, 47–64. https://doi.org/10.1016/j.foodqual.2016.02.009.
Wolstenholme, E., Poortinga, W., Whitmarsh, L., 2020. Two birds, one stone: the effectiveness of health and environmental messages to reduce meat consumption and encourage pro-environmental behavioral spillover. Front. Psychol. 11. https://doi.org/10.3389/fpsyg.2020.577111.