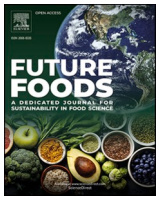
Future Foods 14 (2026) 101107

Contents lists available at ScienceDirect

Future Foods

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



What matters most in upcycled foods? A conjoint analysis of consumer preferences across indulgent and healthy foods

YooHee Hwang [a,*], Anqi (Angie) Luo [a], Weitian (Wela) Li [a], Anna S Mattila [b]

[b] School of Hospitality Management, The Pennsylvania State University, University Park, PA, USA
[a] School of Hotel and Tourism Management, The Hong Kong Polytechnic University, Hong Kong, China

ARTICLE INFO

Keywords:
Upcycled food
Sustainable food
Conjoint study
Cue utilization theory
Goal priming theory

ABSTRACT

Food upcycling is a promising way of combating food waste and hunger. As such, previous research has examined an array of upcycled food attributes driving favorable attitudes and purchase intentions, such as price and labels that emphasize environmental or nutritional benefits. However, past work offers limited insight into how consumers make trade-offs among upcycled food attributes and how such trade-offs differ by food type (indulgent vs. healthy). The current study conducted two laboratory-based conjoint experiments (n = 786) to demonstrate the relative importance of five upcycled food attributes (taste claims, price, environmental, nutritional benefits information, and third-party certification mark). As a result, taste claims were the most important attribute, followed by nutritional benefits, price, and certification mark for *indulgent* upcycled food. Meanwhile, nutritional benefits information was the most important attribute, followed by taste claims, certification mark, and price for *healthy* upcycled food. Regardless of food type, environmental benefits information was the least important attribute. Policy makers, upcycled food producers, and distributors should highlight the nutritional (vs. environmental) benefits of upcycled food.

1. Introduction

While more than 8% of the global population (about 673 million people) are suffering from hunger, more than US$ 1 trillion worth of food is wasted or discarded every year (World Trade Organization [WTO], 2025; Food Waste Index Report, 2024). This paradoxical crisis in the global food system results not only in food insecurity but also in financial losses and negative environmental impacts (Moshtaghian et al., 2021). Beyond the direct financial losses to farmers, manufacturers, and retailers, food waste incurs significant secondary costs associated with collection, transportation, and degradation. In addition, food waste contributes to global warming, accounting for 8-10% of greenhouse gas emissions (United Nations Climate Change, 2024). In response to this challenge, upcycled food emerged as a promising, innovative solution toward a more circular, sustainable food economy. Upcycled food is made from ingredients that would otherwise be wasted and creates greater value from by-products (Aschemann-Witzel et al., 2023; Moshtaghian et al., 2021). It transforms what was once considered "food waste", such as fruit pomace and used coffee grounds, into nutritious and marketable food products (Lu et al., 2024; Maw et al., 2022).

Upcycled food has gained increasing traction among scholars, policymakers, and industry leaders (Ascarrunz, 2022; Lu et al., 2024; Upcycled Food Association, n.d.). However, there are several research gaps. First, although the existing literature highlights several food-related attributes, it is unclear how consumers make trade-offs among them. For example, taste and nutritional value influence the acceptance of upcycled food (Moshtaghian et al., 2021). But which one is more important? Second, the "Upcycled Certified" mark, issued by the Upcycled Food Association, is a new attribute that influences purchase intentions (Hwang et al., 2024). This certification program is to ensure the safety and traceability of upcycled foods and to measure the environmental impact of food upcycling (Upcycled Food Association, n.d.). However, previous research offers limited insight into the relative importance of this certification mark compared to other attributes. Last, past work shows that consumers are more likely to accept indulgent (vs. health) upcycled food (Peschel & Aschemann-Witzel, 2020). However, the relative importance of upcycled food attributes across food types (indulgent vs. healthy) remains underexplored.

To address these gaps, the current research examines the relative importance of five upcycled food attributes (taste claims, price, environmental benefits, nutritional benefits information, and third-party

* Corresponding author.
E-mail address: yoohee.hwang@polyu.edu.hk (Y. Hwang).

https://doi.org/10.1016/j.fufo.2026.101107
Received 5 December 2025; Received in revised form 8 June 2026; Accepted 24 June 2026
Available online 25 June 2026

certification mark) and how it differs across two food types (indulgent vs. healthy). Theoretically, this research integrates critical, yet siloed, food-related factors into a coherent framework that explains how the relative importance of upcycled food attributes varies across food types. In practice, this research provides novel insights for upcycled food producers and marketers by empirically demonstrating the hierarchy of attributes that drive consumer acceptance of different upcycled foods. The findings enable tailored communication strategies, positioning, and product development, thereby accelerating the progress toward a circular food economy.

2. Theoretical background

2.1. Past work on upcycled food

Upcycled foods are safe for human consumption and are value-added products made from ingredients that would otherwise be wasted (McCarthy et al., 2020; Spratt et al., 2021). Previous work reveals that people do not prefer upcycled (vs. conventional) foods, and their willingness to pay for them is low (Asioli & Grasso, 2021; Grasso & Asioli, 2020; Lu et al., 2024). Hwang et al. (2024) show that only 25% of people have consumed upcycled foods. This may be because people tend to avoid new food (Lu et al., 2024). Since upcycled food is a relatively new type of food, people are unsure about its quality and concerned about its safety, taste, and nutritional value (Bhatt et al., 2021; Hwang et al., 2024). Accordingly, previous research investigated the factors influencing the acceptance and willingness to pay for upcycled food. These factors can be divided into individual characteristics (e.g., food neophobia, age, gender, environmental awareness, and price consciousness) and marketing stimuli (e.g., price, package, message framing, and information about environmental and nutritional benefits; Lu et al., 2024).

In terms of individual characteristics, Yilmaz and Kahveci (2022) found that younger (vs. older) generations and female (vs. male) individuals have a greater intention to purchase upcycled food. Coderoni and Perito (2020) found that food neophobia, a resistance to novel foods, is negatively associated with the willingness to purchase upcycled food. Perito et al. (2020) revealed that environmental awareness was positively associated with the acceptance of upcycled olive oil products. McCarthy et al. (2020) found that the more price-conscious people are, the more likely they are to buy upcycled food.

Other studies have focused on marketing stimuli to increase acceptance of upcycled food. Disclosing information about the environmental and health benefits of upcycled food can boost acceptance of upcycled food (Asioli & Grasso, 2021; Grasso & Asioli, 2020). Aschemann-Witzel et al. (2022) compared the effects of three message appeals: environmental benefits, the tradition of using all of what you have ('frugality'), and taste and nutrition. They found that attitudes towards upcycled food are more positive among those who receive a message emphasising frugality than among those who receive a message emphasising taste and nutrition. Still, there was no difference in attitude towards upcycled food between those who received the message emphasising environmental benefits and those who received the message emphasising frugality.

While past work has advanced our understanding of who is more or less likely to purchase upcycled foods and what marketing stimuli are vital for driving upcycled food purchases, limited attention has been paid to how people trade off key attributes of upcycled foods (e.g., price, taste, nutritional benefits). In fact, to enhance the awareness and acceptance of upcycled foods, the Upcycled Food Association in the United States has run the Upcycled Certified program since 2019. The Upcycled Certified requires applicants to (1) submit a document of proof that they adhere to core food safety requirements and regulations (e.g., Hazard Analysis Critical Control Point [HACCP]), (2) meet upcycled input by weight and by tonnage diverted from waste (e.g., upcycled certified products must consist of an aggregate of 10% or more upcycled input by weight), (3) provide proof of an upcycling activity, (4) provide traceability documents, and (5) provide information to assess the impact of reducing food loss and waste. This certification may influence the acceptance of upcycled foods, as eco-labels positively influence intentions to purchase novel foods (Grasso & Asioli, 2020; Ketkaew & Komsing, 2025). Nonetheless, scant research examines how this upcycled certification mark, along with other key attributes of upcycled foods, serves as an important cue to signal the quality of upcycled foods and influence purchase intention. In what follows, cue utilization theory is discussed to explain key upcycled food attributes.

2.2. Cue utilization theory

The current study investigates the relative importance of upcycled food attributes. In this context, cue utilization theory is a relevant framework for understanding how consumers simultaneously evaluate multiple food attributes when making purchase decisions. Cue utilization theory posits that individuals rely on intrinsic and extrinsic cues (or attributes) to form perceptions about food and make purchase decisions (Bruwer et al., 2017; Chi et al., 2021). Intrinsic cues are the inherent characteristics of food and thus cannot be easily altered (Bruwer et al., 2017; Chi et al., 2021). For example, texture, taste, and nutritional composition are the intrinsic cues of food. Conversely, extrinsic cues are external to the food's physical composition, such as front-of-package labels and price (Chi et al., 2021). Extrinsic cues are readily recognized before consumption and are under marketers' control (Richardson et al., 1994).

Consumers simultaneously evaluate intrinsic and extrinsic food cues, and both play important roles in influencing purchase decisions (He & Oppewal, 2018; Konuk, 2021). While intrinsic cues signal the essential quality of food, they may not be readily accessible to consumers, especially prior to trial (Bruwer et al., 2017; Kakaria et al., 2023). For example, when encountering a novel food, people may not be able to assess its intrinsic characteristics (e.g., taste, texture) before consumption. Thus, they rely more on extrinsic cues, such as price or certification mark, to gauge the food quality (Bruwer et al., 2017; Jones et al., 2020; Kakaria et al., 2023; Mishra et al., 2025). In this connection, prior research has predominantly examined the extrinsic cues of novel foods, including upcycled foods (Godden et al., 2023; Hwang et al., 2024).

While extrinsic (vs. intrinsic) cues may be more robust in influencing purchase intention of novel foods (Bruwer et al., 2017; Jones et al., 2020; Kakaria et al., 2023; Mishra et al., 2025), it is still important to investigate how intrinsic and extrinsic cues together influence purchase intention of upcycled food. Nonetheless, previous research offers limited insight into how people trade off intrinsic and extrinsic cues of upcycled food. This study uses taste as an intrinsic cue for upcycled food, whereas price, third-party certification mark, environmental benefits, and nutritional benefits information serve as extrinsic cues. The choice of such cues is based on a comprehensive review of previous research on upcycled foods (e.g., Lu et al., 2024).

While Cue Utilization Theory provides a robust framework for showcasing the relevant attributes that consumers use to evaluate upcycled food, it is less explicit about the situational dynamics that determine the relative importance of these attributes. Therefore, we propose Goal Priming Theory as the dynamic mechanism for understanding how consumers' active goals, triggered by the food type (indulgent vs. healthy), shape the relative importance they assign to upcycled food attributes.

2.3. Goal priming theory

A goal manifests one's desires, wishes, or aims. When goals are activated, people change their beliefs, persevere through hardships, and achieve desired outcomes (Guo et al., 2025). Goal priming theory posits that goals can be activated by subtle environmental cues, which can unconsciously influence behaviors (Bargh et al., 2001; Dijksterhuis &

Aarts, 2010; Guo et al., 2025). For example, Guo et al. (2025) found that when hotel guests were provided with information about the environmental benefits of reusing linens during their stay, this activated their pro-environmental goals and enhanced compliance with the linen-reuse policy.

Previous research has identified several cues that influence consumers' food choices (Chi et al., 2021; He & Oppewal, 2018; Konuk, 2021). However, the relative importance of these cues is not static as consumers make food choices with different goals in mind. With hedonic goals, they seek pleasure, indulgence, and entertainment (Hirschman & Holbrook, 1982). With utilitarian goals, people seek convenience, efficiency, and functionality (Babin et al., 1994). Sensory pleasure through texture, flavour, and taste manifests hedonic goals, whereas nutritional benefits and affordability represent utilitarian goals (Lu et al., 2025). This study proposes that food type (indulgent vs. healthy) activates hedonic vs. utilitarian goals, which in turn makes certain food attributes more salient. For example, choosing a brownie with a scoop of vanilla ice cream (vs. a small fruit cup) for dessert reflects a more hedonic (vs. utilitarian) goal, as it offers less nutritional value and more immediate sensory gratification. The same food can be either hedonic or utilitarian, depending on the cooking method. Freeze-dried fruit chips without any added sugar or salt are relatively healthy, whereas oil-fried fruit chips with some added sugar or salt are relatively indulgent. Misshapen fruits can be freeze-dried or oil-fried to turn into chips. In this study, we use upcycled fruit chips, whether freeze-dried or oil-fried, to represent both healthy and indulgent foods.

Converging evidence indicates distinct consumer perceptions and behavioral outcomes associated with hedonic and utilitarian goals (Volz & Volgger, 2022). In line with this logic, the authors predict that consumers' trade-offs between intrinsic and extrinsic cues for upcycled food differ between indulgent and healthy food types. Specifically, we hypothesize that taste (an intrinsic cue) is most important for indulgent upcycled food, but not for utilitarian upcycled food. This is because indulgent upcycled food is associated with hedonic goals which emphasize immediate sensory gratification (Lu et al., 2025). As the upcycled food certification program ensures safety, traceability, and reduced environmental impact (Upcycled Food Association, n.d.), this certification mark reflects utilitarian values and thus may be valued more for healthy food than for indulgent food. We empirically test this proposition through two rounds of conjoint experiments: one with indulgent upcycled food and another with healthy upcycled food.

Hypothesis 1. The relative importance of upcycled food attributes differs by food type.

Hypothesis 1a. For indulgent upcycled food, attributes related to hedonic goals (e.g., taste) are ranked higher than those related to utilitarian goals (e.g., nutritional benefits, certification mark, price).

Hypothesis 1b. For healthy upcycled food, attributes related to utilitarian goals are ranked higher than those related to hedonic goals.

3. Study 1. Indulgent upcycled food

3.1. Method

A conjoint experiment was conducted in August 2024 at a public university in Hong Kong. Participants were recruited via the university's email directory, which includes faculty, administrative staff, and students. Participants should be at least 18 years old, free of allergies to plantain and coconut oil (the primary ingredients of the upcycled plantain chips for tasting during the experiment[1]), and willing to provide demographic information. An invitation email was distributed in July 2024, resulting in 429 individuals registered. Ultimately, 311 participants participated in the experiment. The authors obtained human ethics clearance (Reference number: HSEARS20230923001) before data collection for Studies 1 and 2.

The experiment was conducted in a food laboratory that accommodates up to 10 participants, each seated at a separate table. Upon arrival, each participant was guided to the assigned seat and provided with a 30-gram sample of upcycled plantain chips. To avoid the taste claims overriding other attributes, we instructed participants not to taste the upcycled food sample until the end of the conjoint experiment. They tasted it only after rating all eight combinations of upcycled food, and right before disclosing their demographic information. By doing so, we sought to reduce the likelihood that taste would prevail over the other attributes. The chips are made with plantains, coconut oil, and sea salt. They were supplied by a US-based company that collaborates with small farms in Latin America to upcycle bananas and plantains into snacks. Each participant received a paper-and-pencil questionnaire. After completing the survey, participants returned the questionnaire and the chip container to a research assistant. Each participant received 50 Hong Kong dollars (HKD; 6 USD) as compensation.

At the outset of the survey, participants were provided with a definition of upcycled food: "Upcycled foods are value-added products made from ingredients that would otherwise be wasted or discarded. Upcycled foods aim to enhance food quality and/or nutritional value while reducing the environmental impact of food waste (McCarthy et al., 2020; Spratt et al., 2021)." Participants were then asked whether they

[1] The review team pointed out that the operationalization of indulgent and healthy snacks with coconut oil-fried plantain chips and freeze-dried banana chips should be empirically validated. Thus, we recruited 47 US residents via Prolific (49% female, 30% age between 30 and 39, 36% college degree, and 30% annual household income of 100,000 USD or above). Using self-administered online survey, we asked each study participant to evaluate how healthy and indulgent coconut-oil fried plantain chips and freeze-dried banana chips are on a 7-point scale (1=not healthy, 7=very healthy; 1=not indulgent, 7=very indulgent). We then conducted a paired samples t-test to compare plantain and banana chips in terms of healthiness and another test to compare those two chips in terms of indulgent characteristics. As a result, our participants perceived freeze-dried banana chips (vs. coconut oil-fried plantain chips) healthier ($M_{banana} = 6.26$, $M_{plantain} = 4.38$, $t\,(46) = 8.57$, $p < 0.01$). By contrast, they perceived coconut oil-fried plantain chips (vs. freeze-dried banana chips) more indulgent ($M_{plantain} = 4.91$, $M_{banana} = 3.47$, $t\,(46) = 5.17$, $p < 0.01$). We also asked two questions: (1) which one do you think is healthier? (2) which one do you think is more indulgent? For the first question, 92% answered freeze-dried banana chips. For the second question, 94% answered coconut oil-fried plantain chips. In conclusion, it is reasonable to conclude that coconut oil-fried plantain chips are relatively indulgent, whereas freeze-dried banana chips are relatively healthy.

had previously consumed upcycled food. Their current hunger level was also measured on a scale from 1 (not at all hungry) to 7 (very hungry).

The main section of the survey required participants to score eight different versions of upcycled plantain chips (Table 1). These versions were generated using an orthogonal design. Five attributes were selected based on a comprehensive review of previous research: price, taste claims, nutritional, environmental benefits, and the certification mark (Aschemann-Witzel and Peschel, 2019; Asioli and Grasso, 2021; Bhatt et al., 2021; Grasso and Asioli, 2020; Hwang et al., 2024; Lu et al., 2024). Each attribute had two levels. Since the number of levels increases the importance value of an attribute (Hair et al., 2013), we keep attribute levels consistent. The price for a bag of upcycled plantain chips (5oz; 140g) was either 35 or 45 HKD (4.5 or 6 USD). Note that the market price was 45 HKD. We compare it to a price 10 HKD lower because previous research predominantly shows that people are willing to pay less for upcycled (vs. regular) food (Grasso & Asioli, 2020; McCarthy et al., 2020; Peschel & Aschemann-Witzel, 2020). We specify 10 HKD lower to ensure the difference between attribute levels is substantial yet not extreme (Hair et al., 2013). The lowest value note is 10 HKD, and we consider the 20 HKD difference too extreme (40% lower than the market price). If we were to compare the market price with its 40% lower price, people would consider this price difference too extreme, to the point where the importance values of other conjoint variables are deflated. Therefore, the comparison of 45 HKD (market price) vs. 35 HKD is deemed adequate.

Taste claims were described as either satisfyingly crisp or unsatisfyingly crisp, based on online consumer reviews. We focus on the crispy texture because it is a dominant attribute in oil-fried chips (Duizer, 2001; Salvador et al., 2009)[2]. Nutritional benefits information was either present or omitted from the front of the package ("These plantain chips contain potassium, fiber, and complex carbohydrates."). Environmental benefits information was also either present or absent ("The chips are made based on sustainable agricultural practices that reduce carbon footprint."). We operationalized nutritional and environmental benefits information based on the actual packaging used by this upcycled plantain chips company. The certified upcycled food mark was either displayed or not displayed on the front of the package.

While there are 32 possible combinations with five attributes at two levels each ($2^5 = 32$), asking participants to evaluate all 32 profiles would be impractical. Therefore, an orthogonal design was employed to reduce the number of profiles to eight. The full-profile presentation method was utilized, with Fig. 1 illustrating Version 1. Participants were asked to score each version from Version 1 to 8 on a 7-point scale, where 1 means "not likely at all to purchase it" and 7 means "very likely to purchase it". After, they were permitted to taste the sample of upcycled plantain chips.

Actual taste was assessed using four items adapted from Wansink et al. (2000) ($\alpha = 0.88$). Intention to purchase the upcycled plantain chips that they tasted was measured with four items from de Vicente Bittar (2018) ($\alpha = 0.84$). Both constructs were evaluated on a 7-point scale, where 1 indicated "strongly disagree," 4 indicated "neither disagree nor agree," and 7 indicated "strongly agree." Toward the end of the survey, environmental concerns were measured using four items from de Vicente Bittar (2018) ($\alpha = 0.78$), along with questions regarding dietary restrictions and demographic information. Table 2 summarizes the measurement items.

[2] The review team pointed out that operationalizations of taste claims of healthy and indulgent upcycled snacks are not consistent. Specifically, the taste claim of indulgent upcycled snack was satisfyingly vs. unsatisfyingly crispy, whereas that of healthy upcycled snack was taste as good as vs. not as good as regular snack. The review team argued that taste claim of indulgent upcycled snack was the most important attribute because of the strong negative wording of unsatisfyingly crispy. To rule out this possibility, the authors conducted an online conjoint study. Details from this additional study are in Appendix.

3.2. Results

Among the study participants, 65% were female, and the average age was 30 years (Standard Deviation [*SD*] = 9.30). Twenty-four percent of participants reported having consumed upcycled food before the experiment. Eight percent of them indicated dietary restrictions, including halal, vegetarian, and low-carbohydrate diets. In terms of annual household income, 20% of participants reported earnings between 40,000 and 65,000 USD, while 13% reported incomes between 65,000 and 90,000 USD. Participants reported a relatively low level of hunger ($M = 3.59$, $SD = 1.50$) and a moderate level of environmental concern ($M = 4.42$, $SD = 1.15$). Perceptions of the actual taste of upcycled chips were moderate ($M = 4.93$, $SD = 1.33$), as was the intention to purchase them ($M = 4.57$, $SD = 1.21$). Table 6 summarizes the demographic profile of study participants.

Regarding the conjoint model fit, Pearson's R value was 0.99 ($p < 0.01$), and there were no reversals, indicating that the conjoint model demonstrated an adequate fit. Participants identified taste claims as the most important attribute, followed by nutritional benefits, price, certified upcycled food mark, and environmental benefits (Table 3). An analysis of the utility estimates indicates that individuals favored indulgent upcycled plantain chips with satisfyingly (vs. unsatisfyingly) crisp texture, nutritional benefits information (vs. without such information), 4.5 USD (vs. 6 USD), the certification mark (vs. without such mark), and environmental benefits information (vs. without such information).

A multiple linear regression analysis was conducted to identify predictors of intention to purchase upcycled food. The regression model demonstrated an adequate fit (F (10, 256) = 49.66, $p < 0.01$), with a moderate adjusted R-square value (0.65). That is, 65% of the total variance in purchase intention was explained by the following variables: actual taste, previous consumption experience, hunger, environmental concern, gender, age, income, and dietary restrictions. Income was coded as a binary variable: 0 for less than 65,000 USD and 1 for 65,000 USD or more. The results indicated that actual taste ($b = 0.65$, t (256) = 18.90, $p < 0.01$), environmental concern ($b = 0.22$, t (256) = 5.31, $p < 0.01$), and income ($b = 0.25$, t (256) = 2.16, $p < 0.05$) were all positively associated with purchase intention. In other words, higher ratings of actual taste, greater environmental concern, and higher income were associated with greater intention to purchase upcycled food. The remaining variables were not statistically significant ($p > 0.1$).

4. Study 2. Healthy upcycled food

4.1. Method

The Study 2 procedure is largely similar to Study 1. Thus, we only discuss the differences from Study 1. Participants must be (1) at least 18 years of age, (2) not allergic to bananas, and (3) willing to provide demographic information. An email invitation was distributed, resulting in 744 responses. Ultimately, 475 participants participated in the conjoint experiment in March 2025. The food laboratory where the experiment took place accommodates a maximum of 30 participants, each seated at a separate station.

Upon arrival at the laboratory, participants received a brief introduction to the study and were provided with a seven-gram sample of the upcycled freeze-dried banana crisps with no additives. Such freeze-dried banana crisps are relatively healthier than coconut-oil fried chips, and thus, they are deemed suitable for Study 2. The freeze-dried banana crisps were purchased from a Hong Kong-based start-up that partnered with grocery stores to upcycle expiring and misshapen fruits into freeze-dried crisps, powders, and sparkling tea.

As in Study 1, there are five attributes with two levels each. The price for 30 grams of freeze-dried banana crisps was either 30 or 40 HKD (3.5 or 5 USD). Note that the market price was 40 HKD. This 10 HKD difference is consistent with Study 1. The certified upcycled food mark was

Table 1
Orthogonal design with eight versions of indulgent upcycled snacks.

	Price	Certified Upcycled Food Mark	Nutritional Benefits	Environmental Benefits	Taste claims
Version 1	6 USD	Yes	Yes	Yes	Satisfyingly crispy
Version 2	6 USD	Yes	No	No	Unsatisfyingly crispy
Version 3	6 USD	No	Yes	No	Unsatisfyingly crispy
Version 4	6 USD	No	No	Yes	Satisfyingly crispy
Version 5	4.5 USD	Yes	Yes	No	Satisfyingly crispy
Version 6	4.5 USD	Yes	No	Yes	Unsatisfyingly crispy
Version 7	4.5 USD	No	Yes	Yes	Unsatisfyingly crispy
Version 8	4.5 USD	No	No	No	Satisfyingly crispy

Fig. 1. Full profile presentation of indulgent upcycled snacks.
Note. Hong Kong Dollar was used for pricing (45 HKD is equivalent to 6 USD; 35 HKD is equivalent to 4.5 USD), as the experiment took place in Hong Kong. We converted to USD using the exchange rate at the time of the experiment for the international audience.

Table 2
List of survey questions for Studies 1 and 2.

Measurement Items	Survey Questions
Actual taste	I like the taste of the chips/crisps
	I like the texture of the chips/crisps
	The chips/crisps taste better than expected
	I feel good eating the chips/crisps
Purchase intention	I would like to purchase the chips/crisps
	I would consider buying the chips/crisps
	I will buy upcycled snacks/fruit crisps in the near future
	I will encourage my relatives and friends to buy upcycled snacks/fruit crisps
Environmental concerns	I always purchase products that are less harmful to the environment
	I have switched products for environmental reasons
	I have convinced my family or friends not to buy products that are harmful to the environment
	I do not buy products that have excessive packaging

either present or absent on the front package. Similarly, the nutritional benefits information was either present or absent on the front of the package, stating, "The banana crisps are vegan, with no added sugar or artificial additives." The environmental benefits information was also either present or absent on the front package, indicating "The crisps used misshapen bananas to reduce food waste and CO_2 emissions." We operationalized the nutritional and environmental benefits information from this Hong Kong-based start-up's website.

Taste claims were categorized as either "as good" or "not as good" compared to the regular crisps, according to consumer review platforms.

Table 3
Conjoint findings from Study 1.

		Utility Estimate	Importance value
Taste claims	Satisfyingly crisp	0.964	30.17
	Unsatisfyingly crisp	-0.964	
Nutritional benefits	Yes	0.754	23.60
	No	-0.754	
Price	6 USD	-0.565	17.69
	4.5 USD	0.565	
Certified upcycled food mark	Yes	0.513	16.06
	No	-0.513	
Environmental benefits	Yes	0.398	12.47
	No	-0.398	

This operationalization was based on feedback from participants (n = 259) in another study by our research team on upcycled food. Those participants were the attendees of a conference in Hong Kong. In that study, we focused on upcycled dried fruits (e.g., dried mangoes, dried pineapples). Participants who mentioned the taste of upcycled dried fruits often compared it to that of regular dried fruits. We assume this comparison occurs because participants commonly consume dried fruits and benchmark the taste of upcycled dried fruits against those they have previously consumed. While this differs from how we operationalized taste claims for indulgent upcycled food ("satisfying vs. unsatisfying crispiness"), we believe that framing dried bananas as "as good" or "not as good" as the regular ones is reasonable.

An orthogonal design was employed to reduce the number of profiles to eight (Table 4). We utilized the full-profile presentation method. Fig. 2 depicts Version 1. As in Study 1, actual taste ($\alpha = 0.87$), purchase intention ($\alpha = 0.88$), and environmental concern ($\alpha = 0.73$) were assessed with 4 items each.

4.2. Results

We excluded 24 responses because they failed an attention-check question ("What fruit crisps did you try?": Strawberry, banana, pineapple, and mango). Therefore, the final sample size is 451. Seventy-two percent of them were female, with an average age of 27 years ($SD = 8.44$). Twenty-nine percent of them had previously consumed upcycled food. Furthermore, 4.7% reported dietary restrictions, including vegetarianism, lactose intolerance, and avoidance of certain food items. Twenty-two percent of them earn between 40,000 and 65,000 USD in annual household income, while 22% earn more than 65,000 USD. Participants reported a relatively low level of hunger ($M = 3.54$, $SD = 1.56$) and moderate environmental concern ($M = 4.22$, $SD = 1.08$). Participants rated the taste of upcycled banana crisps highly ($M = 5.40$, $SD = 1.20$) and showed a moderate level of intention to purchase them ($M = 4.96$, $SD = 1.11$). Table 6 summarizes the demographic profile of study participants.

In terms of conjoint model fit, Pearson's R was 0.99 ($p < 0.01$), and there were no reversals; thus, the conjoint model has an adequate fit. Participants perceived nutritional benefits as the most important attribute, followed by taste claims, the certified upcycled food mark, price, and environmental benefits (Table 5). From the positive and negative signs of utility estimates, we can infer that people prefer upcycled chips with nutritional benefits information (vs. without such information), taste as good as regular banana crisps (vs. not as good), certified upcycled food mark (vs. without such mark), 3.5 USD (vs. 5 USD), and environmental benefits information (vs. without such information).

We also performed multiple linear regression to explain the intention to purchase upcycled food. The regression model had an adequate fit ($F(7, 394) = 41.768$, $p < 0.01$). The adjusted R-squared was 0.416. This means that 41.6% of the total variance in intention to purchase upcycled fruit crisps was explained by the following variables: actual taste, previous consumption experience, hunger, environmental concern, gender, age, and income. Income was dummy coded as 0 (less than 65,000 USD) and 1 (65,000 USD or more). The results showed that actual taste ($b = 0.521$, $t(394) = 14.931$, $p < 0.001$), environmental concern ($b = 0.237$, $t(394) = 6.060$, $p < 0.001$), and income ($b = 0.231$, $t(394) = 2.244$, $p = 0.025$) were positively related to purchase intention, while age ($b = -0.010$, $t(394) = -2.004$, $p = 0.046$) was negatively related to purchase intention. That is, the tastier upcycled fruit crisps are, the more concerned about the environment, the higher the income, and the younger the consumers, the higher the purchase intention. Other variables were not statistically significant ($p > 0.05$).

Table 4
Orthogonal design with eight versions of healthy upcycled snacks.

	Price	Certified Upcycled Food Mark	Nutritional Benefits	Environmental Benefits	Taste Claims
Version 1	5 USD	Yes	Yes	Yes	As good as the regular ones
Version 2	5 USD	Yes	No	No	Not as good as the regular ones
Version 3	5 USD	No	Yes	No	Not as good as the regular ones
Version 4	5 USD	No	No	Yes	As good as the regular ones
Version 5	3.5 USD	Yes	Yes	No	As good as the regular ones
Version 6	3.5 USD	Yes	No	Yes	Not as good as the regular ones
Version 7	3.5 USD	No	Yes	Yes	Not as good as the regular ones
Version 8	3.5 USD	No	No	No	As good as the regular ones

Note. Hong Kong Dollar was used for the price as the study took place in Hong Kong. We have converted to USD using the exchange rate at the time of the experiment for the international audience.

5. Discussion

Upcycled foods are relatively novel solutions to food waste and hunger dilemmas worldwide. As such, upcycled foods have garnered growing traction in academia and industry. Although previous research has advanced our understanding of the attributes of upcycled food that drive purchase intention (Lu et al., 2024), scant research has examined which attributes are most important. That is, it is still unclear how individuals make trade-offs among upcycled food attributes and how these trade-offs vary by food type (indulgent vs. healthy). The authors conducted two laboratory-based conjoint experiments to demonstrate how the relative importance of taste claims, price, environmental benefits, nutritional benefits, and certification mark differs between indulgent and healthy upcycled foods.

5.1. Discussion of findings

Both studies used a conjoint experimental design, and demographic characteristics between Study 1 and Study 2 are largely similar (Table 6). The methodological and demographic consistency across both studies ensures that observed differences in outcomes are comparable. Regardless of whether upcycled food is healthy or indulgent, the environmental benefits information is the least important attribute. We propose two explanations. First, when participants are dealing with a complex task (e.g., differentiating among eight versions of upcycled food and evaluating each), they may ignore or disregard some attributes due to limited working memory capacity (Hensher et al., 2005). In our study, participants may have disregarded the environmental benefits of upcycled food because they were overwhelmed by the task of distinguishing and evaluating the eight profiles.

Second, the importance of the environmental benefits of upcycled food is the lowest among all attributes because the absence of such benefits of upcycled food is not consequential. This indicates that, by nature, upcycled food is eco-friendly, and additional information about its environmental benefits on the front of the packaging may be redundant. In this vein, previous research in cognitive psychology proposes semantic processing/priming (e.g., Collins & Loftus, 1975). Collins and Loftus (1975) suggest that concepts are stored in a network; when one concept is activated, related concepts are automatically activated as well. When people encounter "upcycled food", they unconsciously think of its environmental benefits. Since upcycled food is

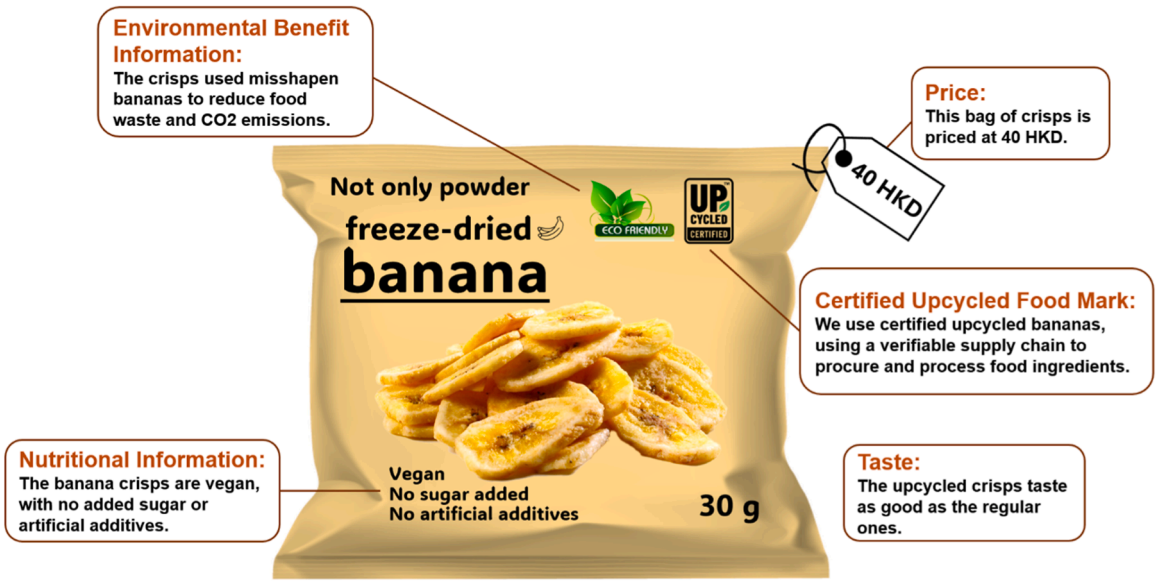


Fig. 2. Full profile presentation of healthy upcycled snacks.

Table 5
Conjoint findings from study 2.

		Utility Estimate	Importance Value
Nutritional benefits	Yes	0.619	24.784
	No	-0.619	
Taste claims	As good as the regular ones	0.508	22.203
	Not as good as the regular ones	-0.508	
Certified upcycled food mark	Yes	0.456	19.027
	No	-0.456	
Price	5 USD	-0.326	18.543
	3.5 USD	0.326	
Environmental benefits	Yes	0.296	15.444
	No	-0.296	

Table 6
Demographic information and attributes importance ranking of indulgent and healthy upcycled snacks.

	Indulgent Upcycled Food	Healthy Upcycled Food
Demographic Information		
Gender (%)	Male: 35 Female: 65	Male: 28 Female: 72
Age	30	27
Previously consumed upcycled food (%)	24	29
Have dietary restrictions (%)	8	5
Annual household income between US$40,000-65,000 (%)	20	22
Hunger (7-point)	3.59	3.54
Environmental concern (7-point)	4.42	4.22
Actual taste (7-point)	4.93	5.41
Purchase intention (7-point)	4.57	4.96
Attributes Importance Ranking		
1st Rank	Taste claims	Nutritional benefits
2nd Rank	Nutritional benefits	Taste claims
3rd Rank	Price	Certified upcycled food mark
4th Rank	Certified upcycled food mark	Price
5th Rank	Environmental benefits	Environmental benefits

assumed to have environmental benefits, additional information about such benefits may seem redundant.

However, there are discrepancies in the relative importance of the attributes of healthy and indulgent upcycled snacks (Table 6). First, for the healthy upcycled snack, participants prioritized nutritional information, followed by taste claims. Conversely, for the indulgent upcycled snack, taste claims were the most important attribute, followed by nutritional information. Healthy snack participants ranked the certified upcycled food mark higher than price, whereas indulgent snack participants ranked price higher than the certified upcycled food mark. Based on goal priming theory, participants who ranked nutritional information higher than taste claims are more influenced by the health consequences of the upcycled snack. Similarly, healthy food primes people to focus on safety and authenticity, leading them to consider the certification mark more important than price. As for the indulgent snack, taste claims and price were ranked higher, indicating that, when participants are primed with hedonic goals, immediate gratification from the sensory and monetary value of food is highly valued.

Finally, multiple linear regression analyses showed some consistent and different findings between the two studies. While actual taste, environmental concern, and income influenced intention to purchase both healthy and indulgent upcycled food, age influenced intention to purchase only healthy upcycled food. Specifically, the younger, the more likely they are to purchase healthy, upcycled food. Although past work shows that age influences healthy food consumption (Lallukka et al., 2007), this line of work shows that the older, the more concerned about health, and thus the more they increase healthy food consumption. This discrepancy may be attributed to the unique characteristics of healthy upcycled food (vs. healthy regular food). Healthy upcycled (vs. regular) food is environmentally sustainable. Thus, previous research on the relationship between age and healthy food consumption may not be directly applicable to the current study.

5.2. *Theoretical implications*

In this research, Cue Utilization Theory provides the foundational framework for identifying the attributes consumers use to evaluate upcycled food. At the same time, Goal Priming Theory explains how activating different consumption goals shifts the importance of these attributes. For example, the certified upcycled food mark may not be important to consumers in general. However, when a healthy goal is primed, this attribute becomes highly salient in signaling safety and

authenticity, thereby ensuring healthiness. Therefore, goal priming serves as the dynamic mechanism that determines the relative weighting of cues identified by Cue Utilization Theory. This study empirically tests this integrated model by examining how the importance of upcycled food attributes changes across different food types.

While past work uses conjoint experiments to examine the relative importance of food cues, it primarily focuses on extrinsic cues (e.g., nutritional benefits information, price, brand; Godden et al., 2023; Hwang et al., 2024; Yamim & Werle, 2025) and excludes intrinsic cues. Although consumers focus on extrinsic cues, especially when encountering unfamiliar foods, such as upcycled foods, they place greater emphasis on intrinsic cues after gaining more knowledge about them (Bruwer et al., 2017). This study adds to this line of work by investigating how individuals make trade-offs between intrinsic and extrinsic cues of upcycled foods. Bajacan et al. (2025) conducted a conjoint experiment to identify key attributes – both intrinsic (e.g., flavor) and extrinsic (e.g., price, packaging material)– that influence preferences for Medium Chain Triglyceride (MCT) oil. The current study extends Bajacan et al.'s (2025) work by demonstrating how food type (indulgent vs. healthy) moderates the relative importance of intrinsic and extrinsic attributes of novel foods.

This study also adds to previous research identifying the factors that influence acceptance of novel foods (Pandey et al., 2025). To be specific, Pandey et al. (2025) reveal that taste is a strong predictor of intention to purchase seaweed-fed cow's milk, whereas price did not predict purchase intention. Similarly, this study finds that taste claims are more important than price in influencing intentions to purchase upcycled foods. It is reasonable to assume that people's unfamiliarity with novel foods stems from intrinsic cues (e.g., taste) but lowering prices may not be effective in driving intention to purchase them. Extending Pandey et al.'s (2025) work, the current study examines how the relative importance of taste claims (vs. price) differs across food types (healthy vs. indulgent).

One may argue that nutritional benefits, environmental benefits, certification, and price (vs. taste claims) reflect utilitarian (vs. hedonic) goals, so those four attributes should be valued more for healthy food. However, we find that taste claims are the second most important attribute for healthy upcycled foods. Although food type heightens one's goal (utilitarian vs. hedonic), consumers also strive for a balance between utilitarian and hedonic attributes of food. To be specific, Li et al. (2024) show that tasty (vs. healthy) cues boost intention to purchase healthy foods. We also find that environmental benefits information was the least important attribute of upcycled food. This may be because upcycled food itself is environmentally friendly, and thus, environmental benefits information sounds redundant to consumers.

Lastly, the current study extends a growing body of literature demonstrating the importance of the food type used for upcycling (Hwang et al., 2024; Xu & Jeong, 2025). To be specific, Xu and Jeong (2025) found that physical and performance risk perceptions negatively influence attitudes toward upcycled wine products, but this effect is more pronounced for utilitarian (vs. hedonic) products. Meanwhile, Hwang et al. (2024) show that the relative liking of upcycled foods compared to organic and plant-based counterparts differs by food type (granola bar vs. burger). While previous research assumes differences between healthy and indulgent upcycled foods, it does not draw on any theory to explain why such differences occur. This study is among the first to draw on goal priming theory to suggest how goals associated with indulgent vs. healthy foods influence the ranking of upcycled food attributes.

5.3. Practical implications

This research provides insights for upcycled food producers and marketers in communication, positioning, and product development. First, our findings suggest specific attributes to prioritize during production. By clearly defining the type of upcycled product, producers can identify and focus on the most critical attributes to improve. As indicated by our results, taste claims are the most critical attribute for indulgent upcycled food, while nutrition is the most critical one for healthy upcycled food. However, when a food's inherent properties make its classification as healthy or indulgent ambiguous (e.g., banana chips), strategic product positioning becomes essential. To promote upcycled food with superior taste, marketers can emphasize indulgent attributes with messaging such as "Sweet & crunchy - Treat yourself to a moment of joy." For an upcycled food with exceptional nutrition, the positioning can highlight the health benefits with claims like "Convenient & nutritious - Energize yourself for an active day". Once these basic qualities are established, companies should then integrate sustainability-focused messaging—such as the certified upcycled food mark and environmental benefits—into their product and marketing efforts, as these elements are most effective when built on a strong foundation of taste and nutrition.

Second, our findings suggest that third-party certification and transparent environmental messaging are influential (Ma et al., 2024). Besides pursuing the certified upcycled food mark, upcycled food companies that primarily focus on producing healthy food can leverage pop-up events and free sample tastings to attract new consumers. More importantly, they can move beyond simply tasting and instead create an educational experience, such as a "Zero-Waste Workshop" that demonstrates the journey from "wasted food" to edible food. In addition, partnerships with local environmental organizations or universities to host thematic workshops—such as "Eat Healthy, Eat Green"—can reinforce the association between health and sustainability.

Third, our findings suggest that businesses can predict consumers' purchase intentions for upcycled food products based on consumer perceptions and characteristics. Specifically, purchase intentions for upcycled food are primarily predicted by high consumer satisfaction with taste, a strong concern for environmental issues, and higher income levels. For both indulgent and healthy upcycled foods, the key to boosting purchase intentions lies in enhancing taste. Additionally, businesses should organize educational activities to raise public awareness about environmental issues and showcase their commitment to eco-friendly practices when introducing upcycled food. Promoting and selling upcycled food in premium supermarkets or malls would be a good choice, as consumers with higher incomes are more likely to shop there and more willing to purchase upcycled food.

5.4. Limitations and future research

Several limitations of our research suggest avenues for future research. First, previous research identified several intrinsic attributes that influence the acceptance of upcycled food, including production methods, texture, and naturalness (Moshtaghian et al., 2021). However, we only considered one key intrinsic attribute. More attributes should be considered in future research. Second, the relative importance of key attributes may change over time. The findings of this research reflect consumer perceptions in a low-awareness market. As consumer familiarity increases and the market matures, the hierarchy of attribute importance may change. Third, we compare the relative importance of five key attributes between indulgent and healthy upcycled foods. Our findings suggest that future research could consider broader food categories — such as snacks, main dishes, side dishes, and dairy — to investigate how these food types influence the relative importance of key attributes of upcycled food.

Finally, we recruited participants from an email list of university faculty, staff, and students. We ensure that our sample is representative of the Hong Kong population. To be specific, 68% of our study participants were female, and females account for 54% of Hong Kong's population (Census and Statistics Department, n.d.). Most participants (22%) fall within the annual household income range of 300,000-500,000 HKD. This reflects the median annual household income of 360,000 HKD (Census and Statistics Department, n.d.). Nonetheless, we

acknowledge that our findings may not generalize to other countries and regions. Future research can examine cross-cultural differences in the ranking of upcycled food attributes. Although we did not measure snacking frequency, our participants are relevant because our recruitment poster clearly stated that study participants need to taste upcycled food snacks during the study, and the study is based on voluntary participation. Future research may investigate how the frequency of consumption of a food category influences people's rankings of upcycled food attributes.

Ethical statement

The authors obtained approval for human ethics clearance from the Hong Kong Polytechnic University prior to data collection (Reference number: HSEARS20230923001).

CRediT authorship contribution statement

YooHee Hwang: Writing – review & editing, Writing – original draft, Supervision, Project administration, Investigation, Funding acquisition, Conceptualization. **Anqi (Angie) Luo:** Writing – original draft, Investigation, Funding acquisition, Conceptualization. **Weitian (Wela) Li:** Writing – original draft, Project administration, Formal analysis, Data curation. **Anna S Mattila:** Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare no conflicting interest in this manuscript.

Appendix

The purpose of this data collection is to operationalize taste claims in indulgent and healthy upcycled food consistently as "tastes as good as versus not as good as regular food". We conducted an online conjoint study and recruited participants ($n = 106$) from Prolific (a UK-based crowdsourced panel platform).

We used deep-fried banana chips to represent indulgent food from this online conjoint study. Table 1 shows the demographic characteristics of study participants from this online study (indulgent upcycled food) and from Study 1 of the manuscript. It is reasonable to assume that study participants in these two studies are largely similar in gender, average age, dietary restrictions, and household income.

Table 1
Demographic profile of study participants.

	Indulgent upcycled food (additional data from online conjoint study)	Indulgent upcycled food (Study 1 from the manuscript)
Gender (%)	Male: 30 Female: 71	Male: 35 Female: 65
Average age (in years)	38	30
Dietary restrictions (%)	9	8
Annual household income between US$40,000-65,000 (%)	21	20

More importantly, we find that the relative importance of five upcycled food attributes for indulgent foods in this online conjoint study largely mirrors the findings from the lab-based conjoint study (Table 2). Even when we operationalized the taste claim of indulgent upcycled food as "tastes as good as versus not as good as regular food" using additional data, we still found that the taste claim is the most important attribute of indulgent upcycled food.

Table 2
Importance values of indulgent vs. healthy upcycled food attributes.

Ranking of attributes by importance values	Indulgent food from additional data	Ranking of attributes by importance values	Indulgent food from Study 1 in the manuscript
Taste claim	30.66	Taste claim	30.17
Nutritional benefits	20.42	Nutritional benefits	23.60
Certified upcycled food mark	20.11	Price	17.69
Price	15.75	Certified upcycled food mark	16.06
Environmental benefits	13.06	Environmental benefits	12.47

Data availability

Data will be made available on request.

References

Ascarrunz, M.C., 2022. Shuggie's trash pie + natural wine: Trash pandas, rejoice! Mission Local. Accessed August 17, 2025 from. https://missionlocal.org/2022/10/shuggies-trash-pie-natural-wine-trash-pandas-rejoice/.

Aschemann-Witzel, J., Peschel, A.O., 2019. How circular will you eat? The sustainability challenge in food and consumer reaction to either waste-to-value or yet underused novel ingredients in food. Food Qual. Prefer. 77, 15–20. https://doi.org/10.1016/j.foodqual.2019.04.012.

Aschemann-Witzel, J., Asioli, D., Banovic, M., Perito, M.A., Peschel, A.O., 2022. Communicating upcycled foods: Frugality framing supports acceptance of sustainable product innovations. Food Qual. Prefer. 100, 104596. https://doi.org/10.1016/j.foodqual.2022.104596.

Aschemann-Witzel, J., Asioli, D., Banovic, M., Perito, M.A., Peschel, A.O., Stancu, V., 2023. Defining upcycled food: The dual role of upcycling in reducing food loss and waste. Trends Food Sci. Technol. 132, 132–137.

Asioli, D., Grasso, S., 2021. Do consumers value food products containing upcycled ingredients? The effect of nutritional and environmental information. Food Qual. Prefer. 91, 104194. https://doi.org/10.1016/j.foodqual.2021.104194.

Babin, B.J., Darden, W.R., Griffin, M., 1994. Work and/or fun: Measuring hedonic and utilitarian shopping value. J. Consum. Res. 20 (4), 644.

Bajacan, G.P.R., Ong, A.K.S., Diaz, J.F.T., Cahigas, M.M.L., Gumasing, M.J.J., 2025. Consumer preference analysis on medium chain triglycerides (MCT) oil in the

Philippines: A conjoint analysis. Future Foods 12, 100721. https://doi.org/10.1016/j.fufo.2025.100721.
Bargh, J.A., Gollwitzer, P.M., Lee-Chai, A., Barndollar, K., Trötschel, R., 2001. The automated will: Nonconscious activation and pursuit of behavioral goals. J. Pers. Soc. Psychol. 81 (6), 1014–1027. https://doi.org/10.1037//0022-3514.81.6.1014.
Bhatt, S., Ye, H., Deutsch, J., Jeong, H., Zhang, J., Suri, R., 2021. Food waste and upcycled foods: Can a logo increase acceptance of upcycled foods? J. Food Prod. Mark 27 (4), 188–203. https://doi.org/10.1080/10454446.2021.1955798.
Bruwer, J., Chrysochou, P., Lesschaeve, I., 2017. Consumer involvement and knowledge influence on wine choice cue utilisation. Br. Food J. 119 (4), 830–844. https://doi.org/10.1108/BFJ-08-2016-0360.
Census and Statistics Department, 2025. Women and Men in Hong Kong – Key statistics. Accessed 1 September 2025 from. https://www.censtatd.gov.hk/en/wbr.html?ecode=B11303032023AN23&scode=180.
Census and Statistics Department, 2025. Households. Accessed 1 September 2025 from. https://www.censtatd.gov.hk/en/scode500.html.
Chi, M., Pan, M., Huang, R., 2021. Examining the direct and interaction effects of picture color cues and textual cues related to color on accommodation-sharing platform rental purchase. Int. J. Hosp. Manag. 99, 103066. https://doi.org/10.1016/j.ijhm.2021.103066.
Coderoni, S., Perito, M.A., 2020. Sustainable consumption in the circular economy. An analysis of consumers' purchase intentions for waste-to-value food. J. Clean. Prod. 252, 119870.
Collins, A.M., Loftus, E.F., 1975. A spreading-activation theory of semantic processing. Psychol. Rev. 82 (6), 407–428.
de Vicente Bittar, A., 2018. Selling remanufactured products: Does consumer environmental consciousness matter? J. Clean. Prod. 181, 527–536.
Dijksterhuis, A., Aarts, H., 2010. Goals, attention, and (un)consciousness. Annu. Rev. Psychol. 61 (1), 467–490. https://doi.org/10.1146/annurev.psych.093008.100445.
Duizer, L., 2001. A review of acoustic research for studying the sensory perception of crisp, crunchy and crackly textures. Trends Food Sci. Technol. 12 (1), 17–24.
Food Waste Index Report, 2024. Accessed October 21, 2025 from. https://www.unep.org/resources/publication/food-waste-index-report-2024.
Godden, E., Thornton, L., Avramova, Y., Dens, N., 2023. High hopes for front-of-pack (FOP) nutrition labels? A conjoint analysis on the trade-offs between a FOP label, nutrition claims, brand and price for different consumer segments. Appetite 180, 106356. https://doi.org/10.1016/j.appet.2022.106356.
Grasso, S., Asioli, D., 2020. Consumer preferences for upcycled ingredients: A case study with biscuits. Food Qual. Prefer. 84, 103951. https://doi.org/10.1016/j.foodqual.2020.103951.
Guo, Y., Cao, Y., Zhao, Y., 2025. The influence of goal priming on hotel consumers' pro-environmental behavior: Moderating effects of temporal and social discounting. J. Hosp. Tour. Manag. 63, 129–139. https://doi.org/10.1016/j.jhtm.2025.03.014.
Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., 2013. Multivariate data analysis: A global perspective. Pearson.
He, Y., Oppewal, H., 2018. See how much we've sold already! Effects of displaying sales and stock level information on consumers' online product choices. J. Retail. 94 (1), 45–57. https://doi.org/10.1016/j.jretai.2017.10.002.
Hensher, D.A., Rose, J.M., Greene, W.H., 2005. The implications of willingness to pay of respondents ignoring specific attributes. Transportation 32 (3), 203–222.
Hirschman, E.C., Holbrook, M.B., 1982. Hedonic consumption: emerging concepts, methods and propositions. J. Mark 46 (3), 92–101.
Hwang, Y., Luo, A., Mattila, A.S., 2024. Why should we try upcycled food? An exploratory study in East Asian and Western contexts. Int. J. Hosp. Manag. 123, 103908. https://doi.org/10.1016/j.ijhm.2024.103908.
Jones, T., Myrden, S.E., Dacin, P., 2020. Services under new management: The myth of a fresh start. J. v. Mark 34 (4), 529–548. https://doi.org/10.1108/JSM-03-2019-0141.
Kakaria, S., Simonetti, A., Bigne, E., 2024. Interaction between extrinsic and intrinsic online review cues: Perspectives from cue utilization theory. Electron. Commer. Res. 24, 2469–2497. https://doi.org/10.1007/s10660-022-09665-2.
Ketkaew, C., Komsing, Y., 2025. How health, ethical, and environmental claims shape sustainable food consumption: the role of eco-labeling information quality in retail food markets. Future Foods 12, 100831. https://doi.org/10.1016/j.fufo.2025.100831.
Konuk, F.A., 2021. The moderating impact of taste award on the interplay between perceived taste, perceived quality and brand trust. J. Retail. Consum. v 63, 102698. https://doi.org/10.1016/j.jretconser.2021.102698.
Lallukka, T., Laaksonen, M., Rahkonen, O., Roos, E., Lahelma, E., 2007. Multiple socio-economic circumstances and healthy food habits. Eur. J. Clin. Nutr. 61 (6), 701–710.
Li, X., Wang, S., Ruan, Y., Pan, Y., Huang, Y., 2024. Taste or health: The impact of packaging cues on consumer decision-making in healthy foods. Appetite 203, 107636. https://doi.org/10.1016/j.appet.2024.107636.
Lu, J., Liu, Y., Jing, Q., Zhang, W., 2025. Chinese consumers' perceptions, attitude, and purchase intention of organic products. Appetite 214, 108142. https://doi.org/10.1016/j.appet.2025.108142.
Lu, P., Parrella, J.A., Xu, Z., Kogut, A., 2024. A scoping review of the literature examining consumer acceptance of upcycled foods. Food Qual. Prefer 114, 105098. https://doi.org/10.1016/j.foodqual.2023.105098.
Ma, S., Zheng, X.J., Lu, P., Xu, Z., 2024. Promoting Upcycled Food: An analysis of social media communication strategies of Upcycled Food Association. Future Foods 10, 100483. https://doi.org/10.1016/j.fufo.2024.100483.
Maw, W.W., Sae-Eaw, A., Wongthahan, P., Prinyawiwatkul, W., 2022. Consumers' emotional responses evoked by fermented rice noodles containing crickets and/or mango peel: impact of product information and prior insect consumption. Int. J. Food Sci. Technol. 57 (9), 6226–6236.
McCarthy, B., Kapetanaki, A.B., Wang, P., 2020. Completing the food waste management loop: Is there market potential for value-added surplus products (VASP)? J. Clean. Prod. 256, 120435. https://doi.org/10.1016/j.jclepro.2020.120435.
Mishra, S., Jain, S., Arora, V., 2025. Investigating the critical factors that shape customers' pro-environmental behavior in luxury hotels. J. Hosp. Mark. Manag. 34 (3), 387–415. https://doi.org/10.1080/19368623.2024.2435846.
Moshtaghian, H., Bolton, K., Rousta, K., 2021. Challenges for upcycled foods: Definition, inclusion in the food waste management hierarchy and public acceptability. Foods 10 (11), 2874.
Pandey, S., Budhathoki, M., Thomsen, M., 2025. Consumer intentions and willingness to pay for seaweed-fed cow's milk: The impact of attitude, knowledge, taste, and price. Future Foods 11, 100539. https://doi.org/10.1016/j.fufo.2025.100539.
Perito, M.A., Coderoni, S., Russo, C., 2020. Consumer attitudes towards local and organic food with upcycled ingredients: An Italian case study for olive leaves. Foods 9 (9), 1325. https://doi.org/10.3390/foods9091325.
Peschel, A.O., Aschemann-Witzel, J., 2020. Sell more for less or less for more? The role of transparency in consumer response to upcycled food products. J. Clean. Prod. 273, 122884. https://doi.org/10.1016/j.jclepro.2020.122884.
Richardson, P.S., Dick, A.S., Jain, A.K., 1994. Extrinsic and intrinsic cue effects on perceptions of store brand quality. J. Mark 58 (4), 28–36.
Salvador, A., Varela, P., Sanz, T., Fiszman, S.M., 2009. Understanding potato chips crispy texture by simultaneous fracture and acoustic measurements, and sensory analysis. Food Sci. Technol. 42 (3), 763–767.
Spratt, O., Suri, R., Deutsch, J., 2021. Defining upcycled food products. J. Cul. Sci. Technol. 19 (6), 485–496.
Upcycled Food Association, 2025. Certifying upcycled food products & ingredients. Accessed November 21, 2025 from. https://www.upcycledfood.org/.
United Nations Climate Change, 2024. Food loss and waste account for 8-10% of annual global greenhouse gas emissions; cost USD 1 trillion annually. Accessed November 21, 2025. https://unfccc.int/news/food-loss-and-waste-account-for-8-10-of-annual-global-greenhouse-gas-emissions-cost-usd-1-trillion. on Oct 21, 2025.
Volz, J., Volgger, M., 2022. Does Airbnb offer hedonic or utilitarian products? An experimental analysis of motivations to use Airbnb. Curr. Issues Tour 25 (22), 3591–3606. https://doi.org/10.1080/13683500.2022.2041564.
Wansink, B., Park, S.B., Sonka, S., Morganosky, M., 2000. How soy labeling influences preference and taste. Int. Food Agribus. Manag. Rev. 3 (1), 85–94.
World Trade Organization [WTO], 2025. Global hunger declines, but rises in Africa and western Asia: UN report. Accessed October 21, 2025 from. https://www.who.int/news/item/28-07-2025-global-hunger-declines-but-rises-in-africa-and-western-asia-un-report.
Xu, Y., Jeong, E.L., 2025. Tourists' perceptions and adoption of winery upcycled products: The moderating effect of product type. Int. J. Hosp. Manag. 128, 104157. https://doi.org/10.1016/j.ijhm.2025.104157.
Yamim, A.P., Werle, C.O., 2025. Nutri-score label influence on food purchase intention depends on consumers' expectations of healthiness. Appetite 207, 107870. https://doi.org/10.1016/j.appet.2025.107870.
Yilmaz, E., Kahveci, D., 2022. Consumers' purchase intention for upcycled foods: Insights from Turkey. Future Foods 6, 100172. https://doi.org/10.1016/j.fufo.2022.100172.