

Article

Using Imagination to Overcome Fear: How Mental Simulation Nudges Consumers' Purchase Intentions for Upcycled Food

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Abstract: Upcycled food, a new kind of food, provides an effective solution to reduce the food waste from the source on the premise of food security for human beings. However, the commercial success of upcycled food and its contribution to environmental sustainability are determined by consumers' purchase intentions. In order to overcome consumers' unfamiliarity with upcycled food and fear of new technology, based on the cue utility theory, we adopted scenario simulation through online questionnaires in three experiments to explore how mental simulation can improve consumers' product evaluation and purchase intentions for upcycled food. Through ANOVA, the *t*-test, and the Bootstrap methods, the results showed that, compared with the control group, consumers' product evaluation and purchase intentions for upcycled food in the mental simulation group significantly increased. Among them, consumers' inspiration played a mediation role. The consumers' future self-continuity could moderate the effect of mental simulation on consumers' purchase intentions for upcycled food. The higher the consumers' future self-continuity, the stronger the effect of mental simulation. Based on the above results, in the marketing promotion of upcycled food, promotional methods, such as slogans and posters, could be used to stimulate consumers, especially the mental simulation thinking mode of consumer groups with high future self-continuity, thus improving consumers' purchase intentions for upcycled food.

Keywords: upcycled food; food waste; mental simulation; marketing communications; inspiration



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1. Introduction

In the field of consumption, food consumption has the strongest influence on the environment [1]. Food waste, a serious problem that humans generally suffer [2], places a greater burden on the environment. According to recent research, at least a third of the food produced globally is wasted [3]. For example, USD 34.8 billion of fresh fruits and vegetables are wasted every year in the United States [4]. The Environmental Protection Agency believes that the most effective way to solve the problem of food waste is to reduce waste at the source [5]. The Food Recovery Hierarchy shows that food waste can be minimized by reducing the production of surplus food [5]. Therefore, researchers advocate using wasted ingredients to create food [6]. These foods are often called upcycled food. The food ingredients used by upcycled food are often wasted close to the source of supply, and often referred to as co-streams or byproducts [7].

Upcycled food is produced by a new cooking method, which solves the food waste problem. Food companies use food waste as the main input to produce upcycled food [8]. Upcycled food is a relatively new food category [9], and many companies are currently involved in the production of upcycled food, such as Renewal Mill in San Francisco, California. Renewal Mill creates a flour okara from the soybean pulp as a byproduct of

soymilk production [10]. In addition, an American company Planetarians has successfully extracted a plant protein from used sunflower seeds. This protein is used to make a variety of safe and nutritionally valuable foods [2]. On the other hand, consumers can also contribute to a sustainable society by choosing sustainable food [11]. Overall, consuming upcycled food is one of the methods to reduce resource waste and promote sustainable consumption behaviors. Therefore, how to promote consumers' purchase intention for upcycled food is of great significance for sustainable consumption behaviors.

Whether upcycled food can achieve success in the real market depends on consumers' acceptance of the food [7]. However, compared with traditional food, consumers' purchase intentions for upcycled food are lower [2,6]. There are only a few studies on the consumer's purchase intention for upcycled food, and in particular, there is insufficient marketing communication tools for upcycled food. In addition, the mental mechanism of consumers has not been explored. Therefore, this study aims to determine the purchase intention of upcycled food from the perspective of mental simulation of marketing communication. Based on the information cue utility theory, this paper proposes that consumers' product evaluation and purchase intention toward upcycled food were improved through the mental simulation of marketing communication skill. Among them, consumers' inspiration played a mediation role, and consumers' future self-continuity moderated the effect of mental simulation on consumers' purchase intention for upcycled food. Besides, males exhibited a higher willingness to accept upcycled food than females. This paper filled the gap between upcycled food acceptability and marketing communication strategy, and further explored the psychological mechanism in which mental stimuli influence consumers' purchases of upcycled food, and the influence of future self-continuity on upcycled food acceptability. As a result, some measures, such as posters and slogans, should be taken to activate the mental simulation thinking mode of consumer in order to improve consumers' purchase intention for upcycled food.

2. Literature Review

2.1. Purchase Intention of Upcycled Food

Upcycled food is a new type of food. Although it was launched in different markets, there are only a few studies on consumers' purchase intention for upcycled food carried out from the current research review, which we divided into four categories.

The first one mainly studied consumers' awareness and acceptance for upcycled food. For example, Bhatt et al. found that consumers thought that upcycled food was more like high-quality organic foods than traditional foods, and eating such food brought more benefits to people [9]. However, when consumers perceived the benefits of upcycled food to the environment, they also had certain technical fears. In a similar concept, there is a certain natural similarity between upcycled food and recycled water [12]. Just as recycled water is a non-traditional alternative to water, upcycled food is also a non-traditional alternative to traditional foods. In addition, these products caused consumer concerns due to non-traditional and radical new methods of production [7]. Savchenko et al. studied consumers' perceptions of foods produced using recycled water [13]. It was found that consumers' safety concerns, disgust, and neophobia are the main obstacles to consumers' acceptance of foods made with recycled water.

The second category discussed the difference between upcycled food and traditional food in consumers' purchase intention or product evaluation. For instance, through experiments, Bhatt et al. [7] found that consumers' acceptance or purchase intention for upcycled food was still lower. Compared with traditional food, consumers purchased less upcycled food. Grasso and Asioli concluded that consumers preferred traditional foods and had a lower preference for upcycled food through a comparison of choice experiments [14]. Most consumers have never heard of "upcycled" ingredients before, but they may consider buying upcycled food.

The third category focused on the differences in the purchase intention of different consumer groups to buy upcycled food and the potential characteristics of these groups.

For example, McCarthy et al. carried out a survey on consumers in Australia and the United Kingdom, and found that nearly half of the 687 respondents were willing to buy upcycled food. These consumers seek status and convenience. They are also concerned about the price and food waste problem [15]. Zhang et al. analyzed consumers' purchase intention for upcycled food in different eras, and found that Generation Z (born between 1995 and 2009), Y (born between 1980 and 1994), and Baby Boomers (born between 1946 and 1964) were more willing to purchase upcycled food, while Generation X (born between 1965 and 1979) was worried about its quality with lower purchase intention [16].

The last category focused on how to improve consumers' purchase intention for upcycled food. For instance, Aschemann-Witzel et al. found that exhibition of the natural ingredients, brand information about the food, communication skills, and gender differences among consumers all played roles in improving consumers' purchase intention for cocoa beverages containing unconventional ingredients [17]. Savchenko, Kecinski, Li, and Messer found out the barriers (disgust and neophobia) for consumers to accept new foods [12], and emphasized that marketing interventions, such as brand promotion, could help increase consumers' acceptance for non-traditional foods [18]. Bhatt et al. pointed out that information transmission could improve consumers' purchase intention. In particular, rational information is more effective than perceptual information [7]. Perito et al. found that providing organic or local labels for the upgraded food can reduce consumers' technophobia and improve the possibility of accepting upcycled food. [19].

It was found that the possibility of consumers' acceptance for upcycled food existed, but the majority of consumers still maintained a strong wait-and-see attitude towards upcycled food. The following four points were thus summarized. Firstly, the consumer's acceptance for upcycled food is not high currently. Secondly, most consumers are unfamiliar with upcycled food and have a certain fear of new technology producing food, such as upcycled food. Thirdly, there are certain differences in purchase intentions among different groups of consumers. For example, the younger generation has higher purchase intentions. Finally, there are insufficient marketing tools to promote upcycled food. Nowadays, there is only limited marketing tools, including rational information, organic and local labels, and brands that explore the mental mechanism of consumers. Based on the above four points, a new marketing promotion method, mental simulation, was proposed to improve consumers' purchase intention for upcycled food and product evaluation, and to dig out the mental mechanism of customer inspiration. The future self-continuity as a consumer trait was introduced, which provided further insights for better segmentation of consumer groups.

2.2. Role of Mental Simulation

The cue utility theory explains how people use effective cues to make decisions [20]. When consumers face new products, such as upcycled food, they can get cues from outside or inside [21]. Internal cues can come from old product knowledge that consumers are familiar with, or content scenarios based on imagined information [22]. Enterprises can activate consumers to search for internal cues through learning strategies. When more self-relevant background details and richer narrative cues are provided, product information will have a greater probability of cognitive processing [23]. At the same time, if food companies can stimulate effective learning of consumers' internal information, this kind of cue will also be favored by consumers because it is easy to obtain and saves cognitive costs [24]. Therefore, this study focuses on the learning strategies of mental simulation from the perspective that consumers' internal cues are actively activated by enterprises.

Mental simulation is the representation of imitating real or hypothetical events [25]. It can promote the connection between thoughts and behaviors well [26], especially the result simulation, which provides people with a problem-solving processing framework by imagining behavioral results, thus affecting people's information processing results [27]. As a way of using internal cues, in the fields of self-help, advertising and retail, mental simulation has been widely used [28]. Mental simulation can greatly improve the attitude

and willingness of consumers in these fields. In particular, the marketing communication strategy of mental simulation has been widely applied in new product marketing, and good results were achieved [23,29]. It is believed that consumers using mental simulation strategy would help target consumers learn and understand new products, reducing their awareness of the uncertainty of new products, and improving their evaluation and purchase intention for new products [29]. For example, Huang et al. found that after mental simulation, consumers could accept those new smart hardware products better, thereby overcoming a certain sense of strangeness and technical fear [23]. Therefore, in the field of new product marketing, the result simulation can guide target consumers to imagine the results and benefits of using or obtaining new products [30], thereby increasing their acceptance of new products. Similar to new products, upcycled food as a new type of food is relatively unfamiliar to consumers, which has a certain sense of disgust and neophobia [7,13]. Therefore, based on mental simulation to enhance the acceptance of new products, it is assumed that when consumers use a learning strategy of mental simulation, they can better understand upcycled food's product benefits by imagining the positive results (such as environmental protection, social sustainable development, etc.) after purchasing upcycled food, thereby improving consumers' purchase intention for upcycled food. The following hypothesis was proposed:

Hypothesis 1 (H1). *Compared with the general consumers, the consumers with the learning strategy of mental simulation significantly improved their purchase intention for upcycled food.*

2.3. Mediator of Consumers' Inspiration

Inspiration is a state of motivation that prompts individuals to put their ideas into practice, which can inspire individuals to form positive behaviors [31]. Boettger et al. introduced psychology's inspiration constructs into marketing practice, forming a new variable of consumers' inspiration [32]. Consumers' inspiration, like inspiration in essence, summarizes an individual's temporary incentive state. When this temporary incentive state appears, the individual can better understand and absorb relevant information and inspire his pursuit of related goals [32], but the slight difference is that the objects of consumers' inspiration mainly exist in the consumer research of marketing. For example, Winterich et al. used consumers' inspiration to explain how the conversion information of recyclable goods can promote consumers' recyclable behaviors [33]. Huang et al. applied consumers' inspiration to explain that the mental simulation can stimulate new smart hardware products, thus increasing their willingness to adopt [23]. The concept adopted in this study is closer to the consumers' inspiration proposed by Boettger et al. rather than inspiration itself [32].

Inspiration caused by external sources is connected with the realization of new ideas [32]. Therefore, inspiration is a complete path formed by the combination of two processes. The first one is the activation component, and the second one is the intention component. For instance, Winterich et al. proposed the effect of product transformation salience on individual recycling behavior [33]. Among them, the product transformation salience is the activating component. The individual is inspired to recycle after being inspired by visual information, and the recycling behavior is the intention component. Therefore, after the stimulation of mental simulation strategy (activation component), consumers' inspiration for upcycled food will generate the inspirational moment of "ahha" through the temporary incentive state [32], which is to better understand upcycled food and to improve consumers' purchase intention for upcycled food (intention component). Therefore, the following hypothesis was presented:

Hypothesis 2 (H2). *Consumers' inspiration played a mediator in the main effect of mental simulation strategy on consumers' purchase intention for upcycled food.*

2.4. Characteristics of Future Self-Continuity

Consumers differ in their personal traits [34] and different personal traits affect mental simulation activities [35]. Time orientations are one of the consumer traits that may play a significant role in healthy behaviors [36], and according to different time orientations, individuals can be divided into past self, present self, and future self [37]. Different time-oriented selves have different thinking patterns. The present and past selves pay more attention to low-level and concrete thinking patterns, while the future self focuses more on high-level and abstract thinking patterns [38]. Although the different time-oriented selves have different thinking modes, the present and future selves are continuous, that is, the future self-continuity [39]. Ersner-Hershfield et al. [39] defined the concept of future self-continuity as “an individual’s awareness of continuity and consistency between his current and future selves”. For example, people with high future self-continuity rated their future self (e.g., 5 or 10 years from now) as having a lot in common with their current self, had a more vivid picture of their future self, and had a more positive assessment of their future self [39]. The future self-continuity also has an influence on consumers’ commitment to social responsibility, such as increasing consumers’ willingness to moral donation and actual donation amount [40], the consumer’s awareness of the individual’s positive goals and achievements [41], and the consumer’s involvement in health-related behaviors [36]. In addition, relevant studies have also shown that consumers with high self-continuity have stronger self-control ability, can better resist temptation, and achieved delayed gratification [41]. Therefore, whether it is the realization of long-term goals or the commitment to social responsibility, individuals with high self-continuity have a better imagination for the future, which conforms to the situation generated by the mental simulations.

Relevant research has initially shown that consumers’ purchase intention for upcycled food is higher in groups with certain traits, such as consumers who pursue status and care for the food waste problem [15], and younger consumers in Gen Baby Boomers [16]. These traits have a certain relationship with future self-continuity. For example, individuals with high future self-continuity pay more attention to moral behavior [40] and personal achievement [41]. Younger groups have more visions, expectations, and considerations for the future [41]. They are more likely to perform mental simulation for future results. Therefore, the future self-continuity as an important consumer trait was introduced into the study of main effects, and the moderating role of future self-continuity under the effect of mental simulation was explored. The following hypothesis was put forward:

Hypothesis 3 (H3). *Future self-continuity could moderate the effect of mental simulation strategy on consumers’ purchase intention for upcycled food. Specifically, the higher the future self-continuity of consumers, the stronger the effect of mental simulation strategy.*

3. Methodology

We explored our hypotheses with three experiments. An experimental method was the best way to determine the causal relationship between variables and had highly internal validity of conclusion [42]. We adopted scenario simulation through online questionnaires for their environmental interference to obtain stable main effect and facilitate the exploration of the mediating mechanism of the effect [43]. Meanwhile, we used different types of stimuli and excluded different confounding variables in three experiments to improve the external validity of our experimental conclusions [44]. Finally, the data processing methods we used and the sample size of the experiments were strictly in accordance with the standards of consumer experiments [29,33].

We conducted experiments through the Credamo online platform. The total number of samples of Credamo platform is more than 1.5 million, covering all provincial administrative regions in China. Besides, Credamo has been used as a source of data acquisition for a number of authoritative journal articles [45,46]. We recruited 450 respondents across China from Credamo to conduct our experiments. Each questionnaire contained a trap

question that “Please choose the ‘red’ in the following options”, and if other colors were selected, the questionnaire were dropped for the careless answer. Finally, 386 surveys (85.78% of all surveys) were adopted in the study (Table 1).

Table 1. Socio-demographics of consumers in Studies 1–3.

Socio-Demographic Indicators		Study 1	Study 2	Study 3
Variable	Definitions	Percentage	Percentage	Percentage
Gender	Male	46.60%	50.80%	51.40%
	Female	53.40%	49.20%	48.60%
Age	≤20 years old	1.70%	0.80%	1.40%
	21–30 years old	69.80%	70.00%	76.40%
	31–40 years old	24.10%	27.70%	20.00%
	41–50 years old	4.30%	1.50%	2.20%
Education	High school degree	8.60%	6.10%	2.90%
	Junior college	12.10%	13.80%	11.40%
	Bachelor’s degree	74.10%	71.50%	78.60%
	Post-graduate degree	5.20%	8.60%	7.10%
Sample size		116	130	140

4. Study 1: Effects of Mental Simulation on Consumers’ Purchase Intention for Upcycled Food

4.1. Experimental Design, Participants, and Procedure

Firstly, the upcycled food for the experiment material was designed. A virtual brand product Fushan peach crisp (36 yuan, 12 pieces × 38 g) was used in Study 1 (Figure 1). It mainly referred to Bhatt et al. [7], but was consistent with consumers in the Chinese market in terms of product image selection and product description. The main product introduction of traditional Fushan peach crisps was: “We are never stingy in terms of raw materials. Natural high-quality wheat flour and natural pressed vegetable oils are used to manufacture with traditional techniques”. In particular, the traditional techniques were: “The craftsmanship and production methods of traditional peach crisp adopt traditional folk production methods”. The main product introduction of upcycled Fushan peach crisp was: “Our raw materials are green and environmentally friendly. Upcycled wheat flour and re-refined vegetable oil are used to produce with upcycled process”. The upcycled process was: “It is a green process that uses by-products of another food as raw materials to manufacture. Wheat flour is the flour ground from grains additionally produced in the beer brewing process and vegetable oil is a secondary refined safe edible oil”.

Secondly, the intergroup design of “upcycled food-mental simulation group” vs. “upcycled food-control group” vs. “traditional food-control group” was adopted, and different groups of manipulation methods were designed. In the upcycled food-mental simulation group, consumers’ mental simulation strategy was initiated by the form of narration [25]. The participants were asked to read the introduction of upcycled food, and to imagine the positive effect on the environment and society after purchasing upcycled food. They were also asked to describe the two positive effects in a paragraph of two sentences (limited to 8–16 words), respectively. In the upcycled food-control group and traditional food-control group, in order to ensure that the participants in these two groups are consistent with the upcycled food mental simulation group in terms of time, cognitive resource consumption, and association valence, the participants were asked to recall any 2 positive things this week, and to describe them in a paragraph of two sentences (limited to 8–16 words), respectively, after reading the food introduction.

Fushan®
Traditional¹
peach crisp




We are never stingy in terms of raw materials. Natural high-quality wheat flour and natural pressed vegetable oils are used to manufacture with traditional techniques

¹ The craftsmanship and production methods of traditional peach crisp adopt traditional folk production methods

Price : 36 12 pieces*38g

(a)

Fushan®
Upcycled²
peach crisp



Our raw materials are green and environmentally friendly². Upcycled wheat flour and re-refined vegetable oil² are used to produce with upcycled process

² It is a green process that uses by-products of another food as raw materials to manufacture. Wheat flour is the flour ground from grains additionally produced in the beer brewing process and vegetable oil is a secondary refined safe edible oil

Price : 36 12 pieces*38g

(b)

Figure 1. (a). Stimuli of traditional peach crisp in Study 1. (b). Stimuli of upcycled peach crisp in Study 1.

Finally, items were used to measure consumers' purchase intention and attitudes. Items about purchase intention mainly referred to Grewal et al.: "The likelihood I would buy this food is", "The probability that I would consider buying this food is", and "My willingness to buy this food is" (1 = extremely low, 7 = extremely high) ($\alpha = 0.803$) [47]. Five items were used to evaluate the participants' inspiration produced by the stimulus: "I

am inspired to buy this food”, “I feel a desire to buy this food”, “I am interested in buying this food”, “I have an incentive to buy this food”, and “I feel an impulse to buy this food” (1 = very inconsistent, 7 = very consistent) ($\alpha = 0.893$) [32]. In addition, in order to exclude the effect of consumers’ emotional changes on their purchase intention for upcycled food due to mental simulation, it is necessary to eliminate the effect of consumers’ positive and negative emotions. The revised PANAS scale proposed by Liu Song et al. was used [48], including a total of 6 items: “Enthusiastic”, “Excited”, “Energetic” ($\alpha = 0.752$), “Scared”, “Tense”, “Angry” ($\alpha = 0.95$) (1 = Not at all, 7 = very strong) (Table 2).

Table 2. Items in the questionnaires.

	Score	Items
Purchase intention [47]	1 = extremely low 7 = extremely high	The likelihood I would buy this food is _. The probability that I would consider buying this food is _. My willingness to buy this food is _.
Inspiration [32]	1 = strongly inconsistent 7 = strongly consistent	I am inspired to buy this food. I feel a desire to buy this food. I am interested in buying this food I have an incentive to buy this food. I feel an impulse to buy this food.
Emotions [48]	1 = not at all 7 = very strong	Enthusiastic Excited Energetic Scared Tense Angry
Involvement [49]	1 = very unimportant decision 7 = very important decision	I think that the decision to purchase upcycled food is _?
Quality perspective [50]	1 = strongly disagree 7 = strongly agree	I feel that the described upcycled foods appears to be of good quality. The quality of such upcycled foods is likely to be good.
Novel perspective [33]	1 = strongly disagree 7 = strongly agree	The introduction of this upgraded chicken nugget is very novel.

In the online experiment, each participant was randomly assigned to one of the three groups, and then read the introduction of upcycled food or traditional products. According to the requirements of manipulation, the mental simulation or recall was carried out. Finally, customer’s purchase intention, inspiration, and emotional state for relevant products were tested. In the experiment, questionnaires were distributed through the Credamo online platform, and a total of 130 participants were tested. Among them, questionnaires in which the participants have poor manipulation effect with “Z-shaped” law were deleted. Then, 116 valid questionnaires were obtained, with an effective rate of 89.23%. The samples covered multiple groups and met the sample size required for consumer experiments.

4.2. Results

In SPSS 19.0, the experimental data was analyzed by one-way ANOVA (Analysis of Variance) and the *t*-test (Table 3). The purchase intentions for peach crisps among the three groups were significant. The results indicated that respondents with mental simulation have the highest purchase intention for upcycled peach crisps. Comparing traditional food and upcycled food without mental simulations, there was a significant difference in food purchase intentions between the two groups (the *t*-test for both groups, $p = 0.039$), which implied that consumers generally accepted traditional foods more. Consumers’ purchase intention for upcycled food-mental simulation group was significantly higher than that of the traditional food-control group ($p = 0.025$) and upcycled food-control group ($p < 0.01$). Therefore, the main effect of mental simulation strategy on purchase intention for upcycled food was significant, that is, *H1* was valid.

Table 3. Results of Study 1.

Variable	Definitions	Upcycled Food-Mental Simulation (<i>n</i> = 38)	Upcycled Food-Control (<i>n</i> = 41)	Traditional Food-Control (<i>n</i> = 37)
Purchase intention	Mean (standard deviation) Differences	6.16 (0.66) ***	5.48 (0.66) *** F = 9.805	5.80 (0.72) ***
Positive emotions	Mean (standard deviation) Differences	5.92 (0.72)	5.59 (0.78) F = 1.874	5.77 (0.74)
Negative emotion	Mean (standard deviation) Differences	2.09 (1.83)	1.94 (1.16) F = 0.712	1.70 (1.15)

Notes: *** respectively means significant at 1% level.

According to the mediation analysis program proposed by Zhao et al., and the Bootstrap method proposed by Hayes [51,52], Model 4 in Process was used to test the mediation effect of groups 1 and 2 through customers' inspiration. In the model, the sample size of 5000 was selected under the 95% confidence interval. The results of mediation test of consumers' inspiration did not contain 0 (LLCI = 0.2403, ULCI = 0.6931), indicating that the mediation effect of consumer's inspiration was significant, and the mediation effect was 0.4362. Therefore, *H2* is also valid. At the same time, under the manipulation of different groups, results showed that mental simulation had no effect on emotion of consumers, both in positive emotions ($p > 0.1$) and negative emotions ($p > 0.1$). Therefore, emotional differences between the three groups can be excluded.

We furtherly explored whether the socio-demographics of respondents influenced their purchase intention for upcycled food in the upcycled food-mental simulation group and the upcycled food-control group through ANOVA analysis. Results showed that gender, age, and education have no significant effect on purchase intention for upcycled food (all $p > 0.2$) (Table 4). Besides, the three demographic indicators had no significantly moderation on the impact of mental simulation of purchase intention (all $p > 0.3$).

Table 4. Effects of socio-demographics on purchase intention.

Variable	Definitions	Study1	Study 2	Study 3
Gender	Male	5.83 (0.71)	5.59 (0.93)	5.99 (0.85) ***
	Female	5.78 (0.75)	5.63 (0.97)	5.15 (1.21) ***
Age	≤20 years old	6.00 (0.00)	4.67 (0.00)	4.50 (0.71)
	21–30 years old	5.84 (0.76)	5.60 (0.96)	5.55 (1.13)
	31–40 years old	5.74 (0.62)	5.64 (0.95)	5.69 (1.05)
	41–50 years old	5.60 (0.98)	5.67 (0.00)	6.67 (0.58)
Education	High school degree	5.77 (0.83)	6.13 (0.56)	6.50 (0.58)
	Junior college	5.83 (0.73)	5.91 (0.61)	5.88 (1.16)
	Bachelor's degree	5.80 (0.75)	5.53 (1.00)	5.54 (1.12)
	Post-graduate degree	5.89 (0.27)	5.36 (1.03)	5.23 (0.94)

Notes: *** respectively means significant at 1% level.

In Study 1, the *H1* and *H2* were verified, that is, the mental simulation could improve consumers' purchase intention for upcycled food, and consumers' inspiration played a mediation role in this effect. The differences between upcycled food and traditional food in purchase intentions were also compared after the mental simulation strategy was implemented or not. At the same time, alternative explanations for the emotional differences of participants were excluded under different experimental conditions.

5. Study 2: Moderate Effect of Future Self-Continuity

5.1. Design, Participants, and Procedure

The experimental design of Study 2 was the same as that of Study 1. Bakery products were used in Study 1, while dairy products were adopted in Study 2. A virtual brand product Qixi ice cream was designed (Figure 2). The main product introduction of ice cream was: “Green and environmentally friendly raw materials can be upgraded. Among them, raw milk is extracted from dairy products and scraps of green tea come from refined tea. They are produced through a recycling process that is safe and reliable, which reduces the resource consumption”. Its remark was: “Upgrading and recycling means that the ice cream is produced by a green process that uses by-products of another food as raw materials. Raw milk is formed by secondary refining of remaining milk components in the manufacturing process of other dairy products and scraps of green tea are produced in the production of other tea products”.



Figure 2. Stimulus of upcycled ice cream in Study 2.

In terms of manipulation methods of different groups, the mental simulation group remains the same as in Study 1. In order to better compare the effects of mental simulation, in Study 2, the rational messaging proposed in the study was introduced to the control group, that is, improving consumers' purchase intention through rational messaging [7]. Bhatt et al. proposed that the rational messaging could significantly improve consumers' purchase intention for upcycled food in the form of watching video [7]. However, considering the cognitive load, it is difficult to induce consumers to buy upcycled food through video in actual scenes. Therefore, the manipulation in this study was implemented through textual rational messaging. After the participants read the introduction of food, they would see the specific rational messaging of upcycled food: “(1) According to relevant research conclusions, the food consumption has the strongest influence on the environment. (2) According to recent estimates, at least one third of the food produced globally is wasted. The most effective way to solve the problem of food waste is to reduce waste at the source. By reducing the production of surplus food, food waste can be minimized. (3) This kind of ice cream is upgraded through the recycling technology. Using wasted ingredients from other foods, such as milk, tea, etc., can well solve food waste”.

Consumers were stimulated to produce different states of future self-continuity through the manipulation. The future self-continuity has three manipulation modes: reading task, writing task, and interactive task [53]. The writing task was used in this study, that is, letting the participants discuss or write as required to manipulate future self-continuity. The method proposed by Zhang and Aggarwal was used to enhance or weaken the participants' future self-continuity by describing the similarities and differences between the present self and the future self five years later [54]. In particular, participants in the experimental group needed to imagine and describe in detail two similarities between the present self and the future self five years later, and explained why they maintained this similarity for five years (limited to 10–16 words). The participants in the control group needed to imagine and describe two differences between the present self and the future self five years later, and explained why this difference occurred during these five years (limited to 10–16 words). The operational test for future self-continuity mainly referred to the classic measurement method proposed by Ersner-Hershfield et al. [39], which allowed consumers to choose schemas to measure consumers' future self-continuity. This method has been used in many empirical researches [55] and the specific term is "There are seven patterns, each selection contains two circles, the left one represents your present self and the right one represents your future self after five years. The overlap between the two circles indicates the similarity between present self and future self. The non-overlap indicates that you are totally different from your present self. Please imagine your future self after 5 years and choose one of the following 7 patterns" (Figure 3).

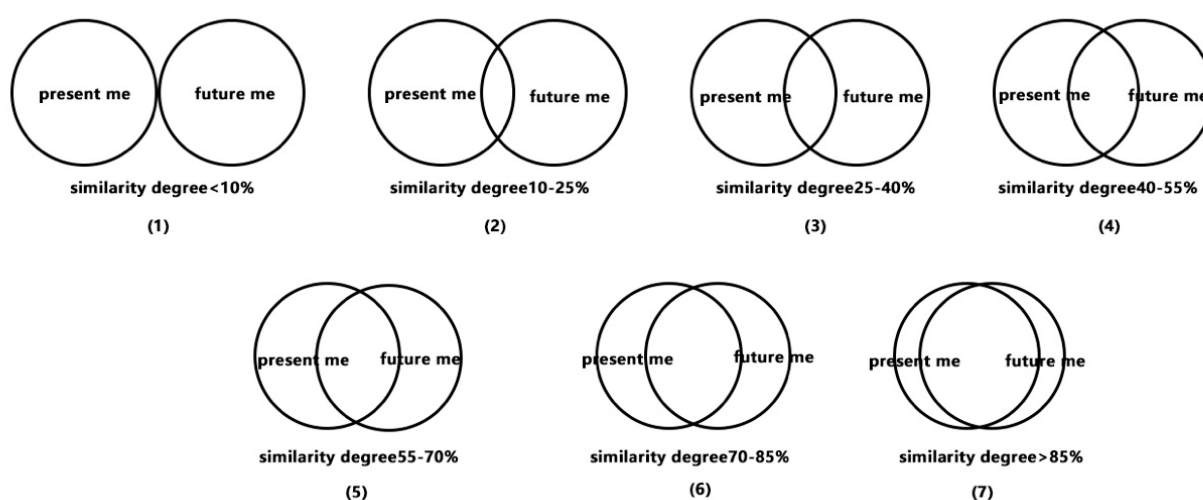


Figure 3. Questionnaire of the future self-continuity testing.

In Study 2, the items about purchase intention [49] ($\alpha = 0.873$) and consumers' inspiration [32] ($\alpha = 0.903$) were the same as those in Study 1. In addition, in order to test that participants' levels of involvement does not change due to different groups' manipulations, the involvement measurement of purchase decision for upcycled food was added. It referred to Vaughn [49], and its item was: "I think that the decision to purchase upcycled food is (1 = very unimportant decision, 7 = very important decision)" (Table 2).

A 2×2 inter-group design of learning strategies (mental simulation vs. rational messaging) and future self-continuity (high vs. low) was adopted. In the online experiment, each participant was randomly assigned to one of the 4 groups. At first, the manipulation of future self-continuity was conducted. They watched the video about the product introduction of upcycled food. Then they followed the manipulation requirements, and conducted the mental simulation or rational messaging stimulation. Finally, they filled in the questionnaires about consumers' purchase intention for relevant product, consumers' inspiration, and video involvement. In the experiment, questionnaires were distributed through the Credamo online platform. A total of 150 participants were tested. After

deleting questionnaires with poor manipulation effects and a “Z-shaped” law, 130 valid questionnaires were obtained, with an effective rate of 86.7% (Table 1).

5.2. Results

The manipulation of future self-continuity was successful. The high and low future self-continuity groups have significant differences in the level of future self-continuity ($p < 0.01$). In SPSS 19.0, the experimental data of consumers' purchase intention were analyzed by one-way ANOVA (Table 5). The effects of two different stimulation methods were first compared. The main effect of mental simulation was significantly different in two groups, which means that people with high future self-continuity, mental simulation can enhance the purchase intentions for upcycled food. Therefore, *H1* was supported again. Then the effects of different future self-continuity on consumers' purchase intention were compared. The main effect difference between the two groups was not significant ($p > 0.1$), indicating that the future self-continuity had no main effect on consumers' purchase intention. Two-way ANOVA and the *t*-test were used to analyze the interaction effect among future self-continuity, mental simulation, and rational messaging strategy. The results showed that the interaction effect was not significant ($p > 0.1$). The specific moderating role was further analyzed. Under the condition of low future self-continuity, there was no significant difference ($p > 0.1$). Under the condition of high future self-continuity, there was a significant difference ($p = 0.003$), which indicated that the effect of mental simulation would be much stronger than that of rational messaging when consumers with high future self-continuity. However, when consumers have low future self-continuity, the effects of different strategies were not obvious. Therefore, *H3* is valid, that is, the future self-continuity can strengthen the effect of mental simulation on consumers' purchase intention.

Table 5. Results of Study 2.

Variable	Definitions	High Future Self-Continuity Group (<i>n</i> = 68)		Low Future Self-Continuity Group (<i>n</i> = 62)	
		Mental Simulation (<i>n</i> = 31)	Rational Messaging (<i>n</i> = 37)	Mental Simulation (<i>n</i> = 32)	Rational Messaging (<i>n</i> = 30)
Purchase intention	Mean (standard deviation) Differences	6.00 (0.81) **	5.32 (0.94) **	5.67 (0.90)	5.49 (1.03)
		<i>t</i> = 3.136		<i>t</i> = 0.726	
Involvement	Mean (standard deviation) Differences	5.48 (1.31)	5.08 (1.06)	5.16 (1.05)	5.4 (1.13)
		<i>F</i> = 0.938			

Notes: ** respectively means significant at 5% level.

According to the mediation analysis program proposed by Zhao et al. and the Bootstrap method proposed by Hayes [51,52], Model 8 in Process was adopted, and the future self-continuity was used as a moderating variable. The mediation effect was tested through consumers' inspiration. In this model, a sample size of 5000 was selected under the 95% confidence interval. The result of mediation test of consumers' inspiration did not contain 0 (LLCI = 0.0574, ULCI = 1.0392), indicating that the mediation effect of consumers' inspiration was significant, with a mediation effect of 0.5418. Specifically, under the condition of low future self-continuity, the result of mediation test of consumers' inspiration contained 0 (LLCI = −0.3311, ULCI = 0.3638). However, under the condition of high future self-continuity, the result of mediation test of consumers' inspiration did not contain 0 (LLCI = 0.2299, ULCI = 0.9283). Therefore, *H2* was supported. At the same time, there was no significant difference in the participants' involvement in purchase intention under the manipulation of different groups ($p > 0.1$).

In Study 2, we also determined the effect of socio-demographics on the purchase intention for upcycled food in four groups through ANOVA analysis (Table 3). Results were similar with Study 1, socio-demographics had no significant effect on purchase

intention (all $p > 0.1$), age and education had no moderating effect on mental simulation condition (both $p > 0.8$) (Table 3). However, gender had a moderating effect on the main effect of mental simulation ($p = 0.44$). In other words, the purchase intention of men (6.02) was significantly higher than that of women (5.67) under mental simulation. Although the effect of gender on upcycled food is not robust enough, it is worth further exploration.

The main effect and mediation effect were verified in Study 1. In Study 2, the role of mental simulation was verified by comparing the stimulus method of rational messaging. At the same time, $H3$ was verified, that is, the moderating role of future self-continuity. Compared with consumers with low future self-continuity, consumers with high future self-continuity that took the mental simulation had stronger consumers' purchase intention for upcycled food. In addition, alternative explanations for the participants' involvement in the purchase of upcycled food were also excluded under different experimental conditions.

6. Study 3: Verified the Stability and External Validity of Conclusions

In Study 3, the external validity of conclusions in this study was further verified. The details were as follows: Firstly, the chicken was used as a stimulus for upcycled food to confirm the external validity of this study. Secondly, Perito et al. improved the possibility of accepting upcycled food through organic labeling [19]. Therefore, the organic food labeling was adopted in this experiment as a control group to compare the differences between effect of mental simulation in different groups. Thirdly, studies found that the consumers' novel perspective had influence on the evaluation of a new product [33,56]. Therefore, we especially estimated the novel perspective of consumers in Study 3 to ensure that consumers' novel perspective was not strengthened by the mental simulation strategy. Fourthly, we hypothesized that the mental simulation method can essentially eliminate the technical fear of consumers for upcycled food [13], also improving the quality assessment of the upcycled food [50]. Finally, Study 3 also verified the mediation effects of socio-demographic indicators (gender, education, age), and clustered respondents into different groups through the two-stage cluster analysis method.

6.1. Design, Participants, and Procedure

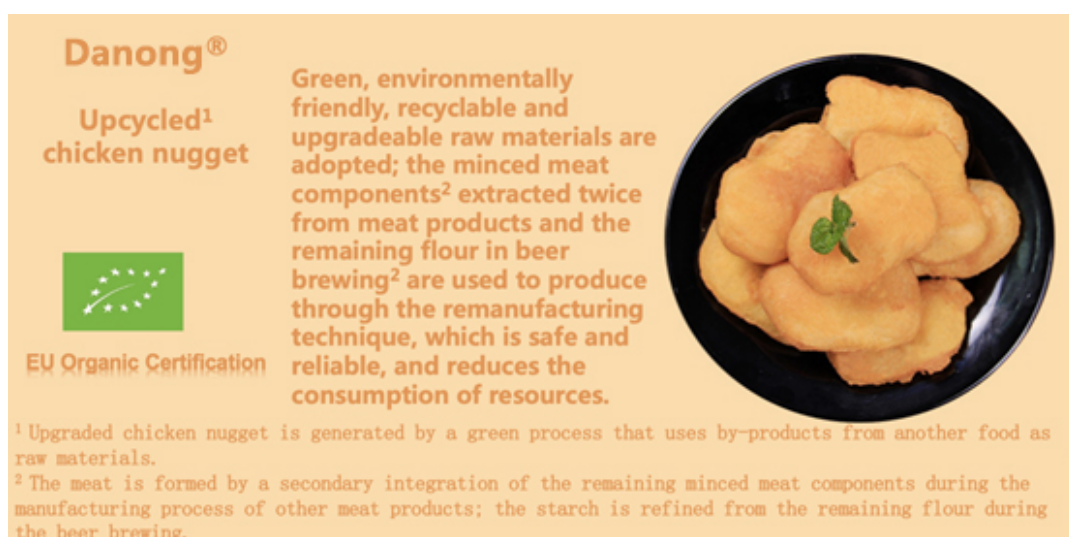
In Study 3, a virtual brand product Danong chicken nugget was designed (Figure 4). The main introduction of chicken nugget was that "green, environmentally friendly, recyclable and upgradeable raw materials are adopted. The minced meat components extracted twice from meat products and the remaining flour in beer brewing were used to produce through the remanufacturing technique, which is safe and reliable, and reduces the consumption of resources". The remarks were that "upgraded chicken nugget is generated by a green process that uses by-products from another food as raw materials. And the meat is formed by a secondary integration of the remaining minced meat components during the manufacturing process of other meat products. The starch is refined from the remaining flour during the beer brewing".

In terms of manipulation, the mental simulation group in Study 3 was the same as that in Studies 1 and 2. As many food-related studies have shown that organic labeling can improve consumers' evaluation or purchase intention for food [14,15], the organic food labeling proposed by Perito et al. was selected as the control group in Study 3 [19]. Therefore, the organic food labeling group was manipulated by attaching a label with "EU Organic Certification" to the introduction of upcycled chicken nugget. To ensure the two groups with the same information, a description of the organic food in this labeling group was added, that is, "this product has passed the EU Organic Certification. And the production base has not used pesticides, fertilizers and other prohibited substances within three years. At the same time, the chemical pollution of raw materials is prevented during the production, processing, storage and transportation." In addition, the control group was used as a benchmark to compare the effects among the three groups.



Price : 38yuan 900g per pack

(a)



Price : 38yuan 900g per pack

(b)

Figure 4. (a). Stimuli of upcycled chicken nugget in Study 3. (b). Stimuli of upcycled chicken nugget with organic label in Study 3.

In Study 3, the items of purchase intention and consumers' inspiration were the same as those of Studies 1 and 2 [16,17]. Consumers' quality perspective of upcycled food were tested [50], including items of "I feel that the described upcycled foods appears to be of good quality" and "The quality of such upcycled foods is likely to be good" (1 = strongly disagree, 7 = strongly agree, $\alpha = 0.909$). In addition, the novel perspective of upcycled food among consumers in different groups was measured [33], including the item of "The introduction of this upgraded chicken nugget is very novel" (1 = strongly disagree, 7 = strongly agree) (Table 2).

The inter-group design of mental simulation group, organic food labelling group and control group was adopted in Study 3. In this study, the participants were randomly assigned to the three groups. After watching the introduction of upcycled food, respondents were required to complete the mental simulation task or read organic food labeling carefully

(respondents in the control group only had to read the introduction of upcycled food), and then they were asked to fill in the questionnaires of purchase intention, quality perception, consumers' inspiration and novel perspective. Questionnaires were distributed by the Credamo and a total of 170 participants were tested. After deleting the questionnaires with "Z-shaped" law, 140 valid questionnaires were obtained with an effective rate of 82.4% (Table 1).

6.2. Experimental Results

In SPSS 19.0, through the one-way ANOVA, the purchase intention from three groups were significantly different (Table 6), which means that organic labelling and mental simulation all have influence on purchase intention, and effects of mental simulation were higher than organic labelling ($p < 0.01$). Meanwhile, the quality perception was analyzed. The main effects of the three groups were also significantly different ($p < 0.01$), indicating both strategies have influence on quality perspective of consumers, and mental simulation has the strongest influence on improving quality assessment. Therefore, $H1$ was verified again.

Table 6. Results of Study 3.

Variable	Definitions	Mental Simulation Group ($n = 46$)	Organic Food Labelling Group ($n = 46$)	Control Group ($n = 47$)
Purchase intention	Mean (standard deviation) Differences	6.14 (0.90) ***	5.48 (1.11) *** F = 11.278	5.13 (1.10) ***
Quality perspective	Mean (standard deviation) Differences	6.04 (0.94) ***	5.71 (0.78) *** F = 8.112	5.18 (1.33) ***
Novel perspective	Mean (standard deviation) Differences	6.11 (1.25)	5.83 (0.96) F = 1.556	5.74 (0.87)

Notes: *** respectively means significant at 1% level.

The Model 4 in Process was used to test the mediation effect of consumers' inspiration. In this model, a sample size of 5000 was selected under the confidence interval of 95% and the purchase intention was used as the dependent variable. The test result of consumers' inspiration did not contain 0 (LLCI = 0.3118, ULCI = 0.9395), which means the mediation effect was statistically significant and value number was 0.6196. When the quality perspective was used as the dependent variable, the test result of consumers' inspiration did not contain 0 (LLCI = 0.2914, ULCI = 0.8923) and its mediation effect was 0.581. Therefore, $H2$ was verified. At the same time, there was no significant difference in the novel perspective of products under the manipulation of different groups ($p > 0.1$), which means that mental simulation and organic labelling had no influence on novel perspective of consumers. Therefore, novel perspective of products can be excluded as an alternative explanation of the mediating mechanism.

In Study 3, we also determined the effect of socio-demographics on the purchase intention for upcycled food of three groups through ANOVA analysis (Table 3). Results suggested that different education levels had no significant effect on purchase intention of consumers ($p > 0.1$) and no moderate effect on metal simulation ($p > 0.1$). Similarly, age also had no significant effect on purchase intention for upcycled food in this study ($p > 0.1$), and no obvious moderate effect on metal simulation was detected ($p > 0.5$). However, results showed that gender had a significant effect on purchase intention ($p < 0.01$) while gender showed no moderate effect on metal simulation ($p > 0.5$). In combination with the analysis of demographic characteristics in Studies 1 and 2, we found that only gender has an unstable impact on upcycled food purchase. Therefore, we used gender as a representative of socio-demographics in the cluster analysis. In this study, through two-stage cluster analysis [57], 140 respondents were clustered into four clusters based on metal simulation,

gender, and purchase intention (BIC = 155.817) (Table 7). Cluster 1 was males with high purchase intention using mental simulation ($n = 28$). Cluster 2 was females with middle purchase intention using mental simulation ($n = 18$). Cluster 3 was males with middle purchase intention and no mental simulation ($n = 44$). Cluster 4 was females with low purchase intention and no mental simulation ($n = 50$). Results implied that in the market, the most likely group to buy upcycled food is men under mental simulation, while the most negative group to buy upcycled food is women without mental simulation. At the same time, the mental simulation strategy to stimulate women can effectively improve their purchase intention and reduce the gender difference in the acceptance degree of upcycled food.

Table 7. Purchase intention of the four clusters.

Cluster	Number	Proportion	Variable		
			Purchase Intention	Metal Simulation	Gender
1	28	20.00%	6.40 (0.64)	yes	male
2	18	12.90%	5.74 (1.09)	yes	female
3	44	31.40%	5.72 (0.86)	no	male
4	50	35.70%	4.94 (1.18)	no	female

7. General Discussion

Upcycled food is a new kind of food that could effectively solve the problem of food waste by reducing the waste at the source of food [2,9,11]. This study conducted three experiments to measure the effect of mental simulation on consumers' purchase intention for upcycled food, and further explored the psychological mechanism and consumer characteristics that influence consumers' purchase of upcycled food.

Based on the information cue utility theory, through three studies, it was found that without market-intervention, consumers' purchase intention for upcycled food was less than that of traditional food, and this conclusion was in line with previous studies [7,14]. This stable conclusion reflected that a marketing communication strategy should be used to improve the purchase intention of consumers with upcycled food [9]. Therefore, scholars proposed different marketing communication methods to enhance the purchase intention of upgraded food, such as rational messaging [7], brand promotion [18], and organic food labeling [19]. However, we proposed a new marketing communication method—mental simulation on the basis of previous research. The results of our experiments indicated that mental simulation was useful in promoting consumers' purchase intention for upcycled food. Besides, it was shown that mental simulation was more effective than rational messaging [7] and brand promotion [18] for the first time.

Most of the previous studies discussed the psychological factors of consumers' resistance to upgraded food, such as fear of technology [12] and safety concerns [13], but did not concern the psychological factors related to the consumers' willingness to purchase upcycled food. In this study, we adopted a new psychological variable—customer inspiration [31], and the psychological motivations of consumers to buy upcycled foods were detected in this study. Using mental simulation strategy, consumers' inspiration for upcycled food can help consumers better understand upcycled food and promote consumers' purchase intention for upcycled food. Compared with the application in the field of new products [33], this is the first attempt to explain the consumption motivation in the field of food consumption by using the concept of customer inspiration, which provided a new perspective for insight into consumers' food consumption. In addition, future self-continuity, which is also a new trait of consumers was introduced to explore the boundaries of consumers buying upcycled foods. In particular, purchase intention of respondents with a high future self-continuity for upcycled food would be stronger after mental simulation, but the future self-continuity had little influence on the rational messaging, and had no significant effect on consumers' purchase intention for upcycled food. Different from the general age [16], geographical location [15] and other socio-demographics, future self-

continuity were the internal characteristics of consumers [36], and it was also the consumer characteristics that can be better manipulated [39]. At the same time, previous studies explored the impact of future self-continuity on healthy food [40] and the commitment to social responsibility [40], but this was the first study to explore the moderating effect of future self-continuity on the purchase intention of upcycled food.

In addition, the quality perspective adopted as a dependent variable was extended to verify the effect of mental simulation, and results showed that mental simulation can reduce consumers' technical fear of upcycled food, which implied that psychological simulation can effectively solve consumers' technical fear of new food [7,12,13]. When compared with previous studies, our conclusion was not only limited to purchase intention [17,18], but also extended to consumers' technical acceptance of upcycled food [7,12,13], which is beneficial to the future exploration of dependent variables of upcycled food. Finally, this study explored the purchase intention for upcycled food based on socio-demographics, and results showed that only gender had an effect on purchase intention. Compared with females, male buyers were more willing to accept the upgrade food, which expanded the research on the effect of gender on food consumption and provided a research basis for future consumer clustering analysis [58]. The results help us better understand the actual differences between the genders in their willingness to buy upcycled food [17].

The theoretical contributions of this study include the following three aspects. Firstly, combining the cue utility theory, the mental simulation in the field of marketing communication is connected with the consumers' purchase behavior for upcycled food for the first time, enriching the theoretical research on the consumers' purchase behavior for upcycled food, which solves the problem that lack of marketing means to improve purchasing intention of recycled food. Secondly, as an exploration of the potential mechanism for upcycled food purchasing behaviors, new inspiration variable in marketing was introduced to serve as a mental explanation mechanism. The mediation effect of consumers' inspiration in mental simulation on consumers' purchase behavior for upcycled food was deeply explored and analyzed. The effect of mental simulation on consumers' purchase intention for upcycled food was effectively revealed and a new perspective for enterprises to understand consumers' mental mechanism in decision-making for purchasing upcycled food was provided. Thirdly, the adjustment and application of mental simulation strategy were further discussed. When consumers have different traits or situational states in future self-continuity, the role of mental simulation will also change. In addition, the influence of gender on purchase intention of upcycled food was verified again. If the future self-continuity and gender of consumers can be combined, enterprises can launch more targeted marketing strategies to encourage consumers to buy upgraded food. Further, it provides certain boundary conditions for the follow-up of further research on consumer groups of upcycled food.

7.1. Managerial Implications

This study provides a practical basis for food companies to improve consumers' purchase intention for upcycled food. First of all, it was verified again that when the prices of upcycled food and traditional food are the same, consumers are less willing to buy upcycled food (Study 1), indicating that consumers cannot fully accept upcycled food without conducting mental simulation and other marketing communications. Therefore, without marketing communication, upcycled food companies should discount its price or adopt other promotion methods to improve consumers' purchase intention for upcycled food. In addition, food companies can not only rely on traditional external cues to stimulate consumers, but also adopt promotional posters and videos in food shopping scenes to guide consumers to carry out appropriate mental simulations. Through the mental simulation, consumers' internal imagination cues were stimulated to perceive the meaning and value of upcycled food. After gaining more perceived value and meaning of inspiration, consumers' acceptance for upcycled food was finally improved. The effect of this mental simulation was even higher than that of the stimulation of rational messaging (Study 2). Finally, upcycled

food companies can guide consumers with high future self-continuity to develop learning strategies of mental simulation, thereby forming consumers' inspiration for upcycled food. Gender was different in purchase intention for upcycled food, among which female consumers had a lower purchase intention. Women are the important decision-makers of household purchasing decisions [59], so it is very important to focus on psychological simulation strategies for women. Data analysis can be used to construct consumer portraits and the characteristics of consumers' future self-continuity and gender are to distinguished by information cues, such as age, usage behavior, etc. At the same time, scenes, such as slogans, posters, videos, etc., can also be used to stimulate the tendency of consumers' high future self-continuity. When consumers have a high future self-continuity, they should be encouraged or induced to develop positive mental associations after purchasing upcycled food. By constructing positive meanings for the environment, society, and ecology, consumers' inspiration should be stimulated to improve consumers' purchase intention for upcycled food.

7.2. Conclusions and Limitations

Results of our experiments indicated that mental simulation was useful in promoting consumers' purchase intention for upcycled food. It was shown that mental simulation was more effective than rational messaging and organic food labeling for the first time. Using a mental simulation strategy, consumers' inspiration for upcycled food can help consumers better understand upcycled food and promote consumers' purchase intention for upcycled food. In addition, consumers' future self-continuity perspective moderated the effect of mental simulation on consumers' purchase intention for upcycled food. In other words, when the participants have highly future self-continuity, their purchase intention for upcycled food would be stronger after mental simulation. In addition, the quality perspective was adopted as a dependent variable to verify the effect of mental simulation, and results showed that mental simulation can reduce consumers' technical fear of upcycled food, which can promote consumers' preference for upcycle food. Finally, this study explored the purchase intention for upcycled food based on socio-demographics, and results showed that only the effect of gender on purchase intention was statistically significant. Compared with women, men buyers were more willing to accept the upgraded food.

The limitations of this study can be divided into three aspects. Firstly, this study lacked comparisons with other marketing tools, such as the activation of consumer environmental goals, the reputation of food brands, and social norms in decision-making environments. Therefore, in future research, we can further compare mental simulations with other marketing communication tools, and propose the application scenes of different marketing tools. To build upcycled food's marketing communication system to comprehensively improve consumers' product evaluation and purchase intention for upcycled food. Secondly, the conclusion of this study also needs to improve the external validity by field experiments. Therefore, field experiments can be used in future research to better measure the actual situation of consumers' purchase intention and to further strengthen the practical significance of the research conclusions. Thirdly, more potential moderating variables need to be considered in this study. In the future, combining theories of reasoned action and taking into account the subjective norm during upcycled food purchasing [60], research can adopt the structural equation model and other methods to better and more systematically estimate the purchase intention for upcycled food, and comprehensively analyze the formation and mechanism of the purchase intention.

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Institutional Review Board Statement: Ethical review and approval were waived for this study, due to experiments in this study is hypothetical, and consumer choose food through pictures, not involving real eating test. Chosen food in this study are prevalent snack in the real market, and those foods do not contain any controversial ingredients and allergens.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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