

Being natural is aesthetic: The effects of “natural” labeling on lay beliefs and the purchase intention of unattractive produce

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Abstract

Purpose – Individuals, organizations, firms, and governments have been making strenuous effort to promote sustainable and green consumption. However, it is noticeable that a large amount of unattractive produce is ruthlessly discarded and wasted around the globe, resulting in unsustainable consumption behavior, harming long-term business development, and breaking the harmonious relationship between humans and nature. Therefore, to increase consumer literacy toward unaesthetic produce, this research investigates the pivotal role of “natural” labeling in increasing purchase intention toward visually unattractive fruits and vegetables.

Design/methodology/approach – By recruiting participants from one of the largest online crowdsourcing platforms (the Credamo), this research conducts three online experimental studies (with two pilot studies) to test three hypotheses based on the cue utilization theory and the lay belief theory.

Findings – The results show that unattractive produce with the “natural” label could significantly increase consumers’ purchase intention compared with those without specific labels. The results also reveal that consumers’ lay beliefs that natural foods are perceived to be tastier and healthier mediate the positive effects of “natural” labeling (vs. no specific labeling) on willingness to purchase.

Originality – This research explores competing lay beliefs about unattractive produce. It identifies the positive effects of lay beliefs “natural = tasty and healthy” through “natural” labeling appeal, thus attenuating the misapplication of lay beliefs “unattractive = tasteless and unhealthy” and broadening the application scope of consumer lay belief theory. The findings also contribute to the cue literature by manifesting the positive consequences of the “natural” label playing as a cognitive cue in priming lay beliefs about naturalness. In addition, it also paves a positive way for business practitioners and marketers to develop the produce industry sustainably.

Keywords: “natural” labeling, unattractive produce, lay beliefs, food waste, sustainable consumption, purchase intention

1 Introduction

It has been witnessed that a large amount of produce is callously discarded and wasted around the globe due to the popularity of product standardization and high requirements for appearance. Especially produce such as fruits and vegetables grown in the natural environment without human intervention are commonly identified as unappealing and not competitive since they usually have bizarre shapes and variances in appearance (Loebnitz *et al.*, 2015). Unsurprisingly, given that visual information plays a vital role in decision-making, consumers have easily avoided and rejected visually suboptimal produce (Diwakar *et al.*, 2022), which further jeopardizes the sustainable development of the environment. Despite consumers' absolute purchasing power, the practitioners are responsible for shaping consumers' consumption behavior and encouraging the successful marketing and commercialization of unattractive produce (Hartmann, 2021; Sutinen, 2022).

To our knowledge, extant work on advancing unattractive produce consumption is far from enough. Up to now, only a few studies have proposed solutions, such as providing discounts (Aschemann-Witzel *et al.*, 2018), reducing consumers' diagnosability of unattractive produce and improving the self-esteem of consumers (Grewal *et al.*, 2019), conducting anthropomorphism communication (Chen *et al.*, 2021), adding “ugly” labels (Mookerjee *et al.*, 2021), and developing the linkage between food waste reduction and ugly food purchase (Qi *et al.*, 2022). Yet, these strategies either devalue the produce or require high marketing costs. More importantly, these studies are seldom based on probing into or justifying the innate attribute of unattractive produce grown in the natural environment. There is a lack of consumer literacy regarding the association between the aesthetics of produce and naturalness.

However, consumers hardly access implicit information on naturalness regarding suboptimal produce. As a result, consumers often resort to lay beliefs that generally stem from easily observable contextual cues and engage in intuitional processing to guide their evaluations of food attributes (Chan, 2022). Specifically, when lacking cognitive cues such as

food labels, consumers can hardly make informed choices by accurately evaluating food attributes (Lagerkvist, 2013). Once consumers encounter aesthetically flawed products, they would resort to sensory cues and rely on lay beliefs “unattractive = tasteless and unhealthy” to reduce the purchase of unattractive produce (Schifferstein *et al.*, 2019). Priming lay beliefs about naturalness that “natural = tasty and healthy” through a cognitive cue—the “natural” label—may be feasible when correct consumer bias against unattractive produce. We expect that the “natural” label would make lay beliefs about naturalness more protruding than the other and allow cognitive cues to dominate over sensory cues. The core finding that underlies our research is that the subtle priming in the ugly produce context can activate consumers’ lay beliefs about positive perceptions (i.e., improving tastiness and healthiness) of produce. This is because the activated lay beliefs match the consumption-related stimulus—natural attributes of ugly produce. In this sense, the labeling-driven strategy is identified as one of the instrumental practices that can improve customers’ perceived food’s innate attributes and consumer satisfaction (Liang and Lim, 2020). In short, we propose “natural” labeling might directly point out the inherent naturalness of unattractive produce, which is the main concern for consumers.

Our work makes several theoretical contributions and practical implications. The findings enrich the literature on the food economy and individual consumption and fill out the research gap of discovering the underlying value of unattractive produce via the “natural” label. Besides, our research broadens the application of consumer lay belief theory in the agricultural products field. While most previous studies have discussed competing lay beliefs separately, such as the “unhealthy = tasty” (Haasova and Florack, 2019; Mai and Hoffmann, 2015; Raghunathan *et al.*, 2006) and the “healthy = tasty” (Werle *et al.*, 2013), our research explores more nuanced perspectives concerning how competing lay beliefs about the visual appearance and the naturalness of produce interact and provide a path to attenuate the misapplication of lay beliefs “unaesthetic/unattractive = tasteless and unhealthy” by identifying “natural = tasty and healthy”. Our research also offers practical guidance to marketers on how and why the “natural” appeal may function in the marketplace. “Natural” labeling is expected to reshape sustainable consumption behavior and would ultimately contribute to overall food waste reduction.

2 Theoretical background and hypotheses development

2.1 Unattractive produce

“Unattractive produce” is atypical in size, color, and shape compared to the regular category (de Hooge *et al.*, 2017). In our research, we focus on the produce that does not meet the public aesthetic criteria in the process of natural growth by farmers, such as moderately deformed and poorly colored produce. But meanwhile, there are no unsafety attributes within them (de Hooge *et al.*, 2017). However, consumers perceive unattractive produce negatively by such cosmetic flaws, significantly hindering their purchase decisions (Grewal *et al.*, 2019; de Hooge *et al.*, 2017; Loebnitz *et al.*, 2015). Food shape can affect purchase intention. For example, consumers prefer normally shaped produce to moderately or highly deformed ones (Loebnitz and Grunert, 2015). And the color of food also counts in influencing consumers’ judgments of the taste and flavor (Paakki *et al.*, 2019). For example, produce is considered tastier if it looks more appealing (Zellner *et al.*, 2014). Consumers are unwilling to purchase produce exhibiting abnormality and cosmetic damage (Holweg *et al.*, 2016), even if these discarded items are not rotten ones and nevertheless offer the same quality and taste guarantee as their attractive counterparts.

Cue utilization theory would explain why consumers show a lower preference for suboptimal produce. It describes how consumers infer attributes of foods from perspectives of sensory (bottom-up, intrinsic) and cognitive cues (top-down, extrinsic) (Konuk, 2021; Krishna and Elder, 2021). Sensory cues comprise multiple unchanged elements, such as shape and color; instead, cognitive cues are endowed purposely through external factors like price, brand, or labels (Chan, 2022; Krishna and Elder, 2021). As a rule, when a cognitive cue is absent, consumers tend to use sensory cues to infer the freshness, taste, and quality of produce with their eyes at first sight of them (Zellner *et al.*, 2014). Given this, it would be practical to make consumers informed through cognitive cues (van Esch *et al.*, 2019). Labels are helpful external factors as they provide an important way for consumers to quickly obtain relevant information and infer the intrinsic attributes of produce (Creusen and Schoormans, 2005; Schuldt, 2013).

2.2 Lay beliefs about attributes of unattractive produce

Lay beliefs refer to heuristic inferences, including previous experiences, knowledge, and intuitions about the world that are nestled in people's minds (Schwarz, 2015; Sussman *et al.*, 2021). Consumers typically form preferences and make purchase decisions depending on lay beliefs, especially when they have asymmetry information (Broniarczyk and Alba, 1994). When purchasing, they often have ambiguous product details and cannot instantly make inferences about unobservable attributes such as taste and healthiness. They would, therefore, overemphasize shared lay beliefs grounded on available cues (Shapiro *et al.*, 2009). For example, appearance is the primary determinant of choices without a cognitive cue (Makhal *et al.*, 2020), which constitutes consumers' first sensory impression and directs their acceptance or rejection of consumption (Bitner, 1992; Xu *et al.*, 2021). Research has found that consumers react vigorously toward unattractive appearances and regard them as tasteless and unhealthy (Jaeger *et al.*, 2018). Lay beliefs "unattractive = tasteless and unhealthy" may hinder consumers' chance of choosing unattractive produce.

Typically, opinion change occurs with increased comprehensibility of a persuasion message (Eagly, 1974). Therefore, to correct consumers' misconceptions about the unattractive appearance of produce, our research suggests a path that may enhance consumers to hold more positive evaluations of ugly produce through the following mental process: their attentions shift away from the aesthetic appearance toward the naturalness of unattractive produce where "natural" labeling plays as priming. We suppose the "natural" label on moderately abnormal produce would help consumers recognize and accept the deviations in its physical appearance because they perceive the deviation as more natural (Loebnitz *et al.*, 2015).

Earlier research has shown how applying a relatively healthy name weighs on the perception of healthiness (Irmak *et al.*, 2011). Other research has also examined different nutrition and ingredient labels and found that consumers believe that food labeled "organic" or "low in cholesterol and fat" is healthier (Lee *et al.*, 2013). In recent years, natural products are gaining popularity since consumers tend to pursue sustainable and healthier lives (Kahraman and Kazançoğlu, 2019). For example, according to a U.S. national online survey, consumers are willing to purchase and even pay a higher premium for natural beef products (Umberger *et al.*, 2009). However, some labels can hardly be used widely. For instance, organic labeling

seems to deter common consumers from purchasing due to higher prices (Loebnitz *et al.*, 2015). Therefore, the profusion of different labels is necessary and may perform complementarities (Padel and Zander, 2010). The “natural” label might remind consumers of the natural attributes of unattractive produce. Then, we propose the following hypothesis:

H1. “Natural” labeling (vs. no specific labeling) increases consumers’ purchase intention of unattractive produce.

2.3 Importance of tastiness perception and healthiness perception

Taste refers to the sensory and perceptual experience of the tongue (Krishna and Elder, 2021). This research explores both the sensory and cognitive cues that influence taste, as well as lay beliefs’ shift from the former to the latter after taking “natural” labeling appeal. In terms of the sensory cue, the appearance of food is reported to affect its tastiness perception along with the preference and consumption behavior (Mookerjee *et al.*, 2021), such as the color (Paakki *et al.*, 2019; Zampini *et al.*, 2007) or the shape of food (Velasco *et al.*, 2015). For example, 85% dark chocolate might elicit taste perceptions of bitterness. Similarly, they take for granted that fruits and vegetables with irregular color or shape are less tasty even if the very taste is equivalent (Leksrisompong *et al.*, 2012). Consumers are probably to speculate that unattractive produce is of inferior quality and gradually form a stereotyped lay belief that “unattractive = tasteless”.

Despite the food’s appearance, a finding states that information concerning the naturalness of unattractive produce can increase purchase choices at least as much as price discounts (Van Giesen and de Hooze, 2019). As Mookerjee *et al.* (2021) suggested, natural food products have both taste and nutritional benefits. And consumers are accustomed to associating naturalness with tastier (Rozin, 2005, 2006; Saraiva *et al.*, 2020). That is the naturalness attribute within unattractive produce guarantees better taste.

So, it is essential to make consumers rethink their evaluations of the visual appearance of produce by eliminating the adverse effects of its unattractiveness on produce through cognitive cues such as labels (Helmert *et al.*, 2017; Sundar *et al.*, 2021). Labels will likely correct taste perceptions before tasting (Konuk, 2021). For example, generic messages such as healthy and natural can be seen in packaged foods, known as the health halo effect (Acton and Hammond,

2018). Our research holds that the “natural” label may correct the lay belief that “unattractive = tasteless” and communicate precise reasons for buying unattractive produce. Therefore, we propose the following hypothesis:

H2. Improved tastiness perception mediates the positive effects of “natural” labeling (vs. no specific labeling) on purchase intention of unattractive produce.

Presumably, food healthiness should be determined by the food’s nutritional facts (Fernandes *et al.*, 2015). In reality, however, evaluating food healthiness is complex and subjective. It often depends on consumers’ perceptions about the nutritional benefits of food and the expected influence on their health based on their lay beliefs (Deval *et al.*, 2013). If without other information, visual elements (e.g., shape, colors) as sensory cues would drive lay beliefs about food healthiness (Spence, 2012). As a result, consumers tend to expect misshapen produce to be less healthy (Hagen, 2021). The lay belief “unattractive = unhealthy” may lead consumers less likely to choose unattractive produce.

However, as we have discussed, it is unavoidable for produce to have physical defects or blemishes in natural growth. Therefore, given that unattractive fruits and vegetables show the natural variability of food, it creates an opportunity for stakeholders of the natural produce industry to promote the produce’s naturalness (Hartmann, 2021).

Naturalness implies that the product has neither undergone human treatment or intervention nor any chemical additives (Scott and Rozin, 2017). “Natural” represents health and reassurance (Li and Chapman, 2012; Rozin, 2005; Scott *et al.*, 2020). In this sense, the “natural” label is an interpretation of unattractive produce. Consumers’ lay belief that “natural = healthy” can thus be inspired toward deformed produce. The process of consumers’ inferences relating to lay beliefs evoked by “natural” labeling is realized by healthiness perception. Healthiness is typically a hidden attribute that needs to be conveyed to consumers with information. As for unattractive produce, trust in healthiness attributes can diminish perceived risk as well as enhance purchase intention (Konuk, 2021). Then, consumers would be more willing to pay for unattractive produce if labeled “natural”. Therefore, we propose the following hypothesis:

H3. Improved healthiness perception mediates the positive effects of “natural” labeling (vs. no specific labeling) on purchase intention of unattractive produce.

3 Overview of studies

We test our proposed hypotheses through two pilot studies and three formal experiments. Pilot studies A and B are designed to confirm widespread lay beliefs in consumers’ minds: natural = tasty (Pilot study A) and natural = healthy (Pilot study B). We then test the main effect that whether “natural” labeling positively affects consumers’ purchase intention of unattractive produce (Study 1A and Study 1B). We further explore the underlying mechanism of this main effect (Study 2). It is necessary to note that we test the effects of the “natural” label on unattractive produce exclusively without including regular ones for the reason that biased lay beliefs “unattractive = tasteless and unhealthy” rooted in consumer’s minds are merely drawn on unattractive produce while almost no alike doubts are on attractive ones. Grounded on the cue utilization theory and the lay belief theory, the research framework is developed as follows (see Figure 1). Taken together, these studies show that the effect extends across different produce types (see Figure 2 for stimuli). Participants in all studies are recruited from Credamo, one of China’s most popular online crowdsourcing platforms, and compensated with monetary incentives.

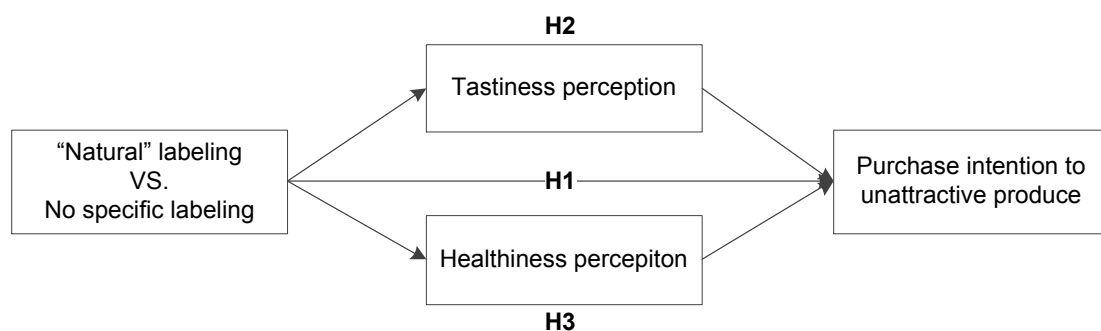


Figure 1. Research framework.


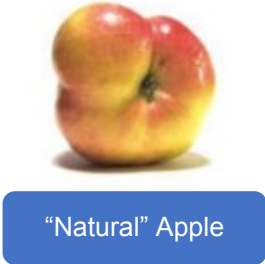
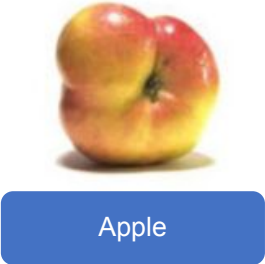
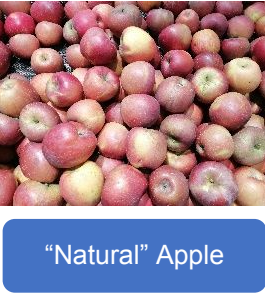
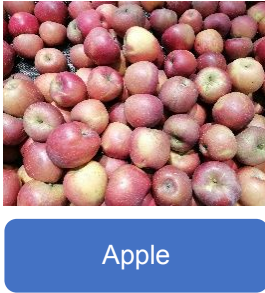

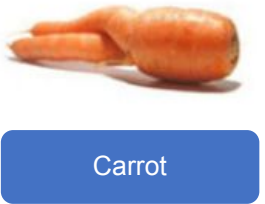
<p>Pilot study A and B</p>		
<p>Study 1A</p>		
<p>Study 1B</p>		
<p>Study 2</p>		

Figure 2. Stimuli across studies.

4 Pilot study

4.1 Pilot study A: the lay belief that naturalness is tasty

Pilot study A aims to establish the implicit association between naturalness and tastiness. To evaluate how much people have already accepted the intuition that natural is tasty, we use

word description task and scale measurement to verify this lay belief (Mai *et al.*, 2019).

4.1.1 Method. In pilot study A, sixty-three participants ($M_{\text{age}} = 26.94$ years, 63.5% female) were recruited. All participants were randomly assigned to one of two (unattractive produce: “natural” labeling vs. no specific labeling) between-subjects conditions (see Figure 2). In the “natural” label condition, we manipulated the label attached to unattractive fruits and veggies: “Natural fruits and veggies”. In the control condition, the label was manipulated: “fruits and veggies”. After viewing the pictures, the participants were asked to describe how they felt about the fruits and vegetables in the pictures by selecting five of ten alternative words. There were five adjectives related to tasty (tasty, flavorful, juicy, crisp, fresh) and five other adjectives related to tasteless (unpalatable, awful, bitter, tasteless, stale). Then, participants rated how much they agreed with “the fruits and vegetables in the picture look delicious” (1 = strongly disagree, 7 = strongly agree). Finally, participants completed a 3-item manipulation check question regarding unattractiveness (e.g., “less beautiful,” “ugly,” “unattractive”; 1 = strongly disagree, 7 = strongly agree; Cronbach’s $\alpha = 0.929$; Grewal *et al.*, 2019; Mookerjee *et al.*, 2021). And then, all participants reported basic demographic information.

4.1.2 Results. Manipulation check. For unattractiveness, the produce was perceived as less beautiful since participants’ rating on produce appearance was significantly higher than the scale midpoint (4) ($M = 4.53$, $SD = 1.97$; $t(62) = 2.13$, $p = 0.037$). What’s more, in both the “natural” label condition ($M = 4.19$, $SD = 1.71$) and the no-label condition ($M = 4.85$, $SD = 2.17$), the evaluation of unattractive produce was more than 4. There was no significant difference between the two conditions ($F(1, 61) = 1.80$, $p = 0.185$), indicating that “natural” labeling did not affect participants’ perception of appearance toward unattractive produce. Therefore, manipulation of the unattractiveness of produce was successful.

Word description task. We marked tasty words as “1” and tasteless words as “-1”, and then added up these scores of words selected by each participant to form a tastiness perception index. Results showed that participants in “natural” label condition chose more words related to tasty than those in the control condition ($M_{\text{“natural” label}} = 3.39$, $SD = 2.99$ vs. $M_{\text{control}} = -1.19$, $SD = 4.58$; $F(1, 61) = 21.89$, $p < 0.001$, $\eta^2 = 0.26$).

Scale measurement. The results showed that participants were more likely to agree that

unattractive produce with a “natural” label ($M = 5.29$, $SD = 1.55$) tasted better than those with no specific labels ($M = 3.41$, $SD = 2.05$; $F(1, 61) = 16.87$, $p < 0.001$, $\eta^2 = 0.22$).

4.2 Pilot study B: the lay belief that naturalness is healthy

Pilot study B aims to establish the implicit association between naturalness and healthiness, verifying the lay belief that naturalness is healthy. We predict that unattractive produce with a “natural” label would be perceived as healthier than unsightly produce with no specific labels.

Method. Fifty-nine participants ($M_{age} = 25.32$ years, 66.1% female) were recruited. All procedures and manipulations in pilot study B were the same as in pilot study A. The difference was that there were five adjectives related to healthy (healthy, nutritional, full of vitamins, pure, good for me), and five other adjectives related to unhealthy (unhealthy, innutritious, lack of vitamins, harmful, bad for me).

4.2.2 Results. Manipulation check. For unattractiveness, the produce was perceived as less beautiful since participants' rating on produce appearance was significantly higher than the scale midpoint (4) ($M = 4.63$, $SD = 1.76$; $t(58) = 2.76$, $p = 0.008$). What's more, in both the “natural” label condition ($M = 4.32$, $SD = 1.61$) and the no-label condition ($M = 5.03$, $SD = 1.90$), the evaluation of unattractive produce was more than 4. There was no significant difference between the two conditions ($F(1, 57) = 2.36$, $p = 0.130$). Therefore, manipulation of the unattractiveness of produce was successful.

Word description task. The health-related words were marked as “1” and the unhealthy words as “-1”, and the individual's word choice scores were added up to form the healthiness perception index. Results showed that participants who saw a picture of fruits and veggies with the “natural” label chose more words related to healthy than the group without specific labels ($M_{\text{“natural” label}} = 2.55$, $SD = 3.35$ vs. $M_{\text{control}} = 0.58$, $SD = 4.13$; $F(1, 57) = 4.08$, $p = 0.048$, $\eta^2 = 0.07$).

Scale measurement. The results showed that participants were more likely to agree that unattractive produce with a “natural” label ($M = 4.94$, $SD = 1.64$) would be healthier than those with no specific labels ($M = 3.81$, $SD = 1.90$; $F(1, 57) = 6.04$, $p = 0.017$, $\eta^2 = 0.10$).

5 Study 1: “natural” labeling and purchase intention

5.1 Study 1A

Study 1A is designed to examine whether using the “natural” label could affect the purchase intention of unattractive produce. It is predicted that produce with the “natural” label would be more likely to be accepted by consumers than produce without specific labels.

5.1.1 Method. One hundred thirty-eight participants ($M_{\text{age}} = 29.91$ years, 57.2% female) were recruited to complete the online experiment in Study 1A. Participants were randomly assigned to one of two conditions: “natural” labeling vs. no specific labeling (control).

Participants imagined shopping in a supermarket and seeing unattractive apples in the fruit aisle (see Figure 2). Referring to the previous study (Loebnitz and Grunert, 2015), we presented a picture of produce with moderate deviation from regular produce in shape to all participants. Participants were shown the same produce image, except for the label. In the “natural” label condition, we manipulated the label attached to an unattractive apple: “Natural’ Apple”. In the control condition, the label attached to the unattractive apple was manipulated: “Apple”. After reading all the information, the participants completed a 3-item purchase intention index (i.e., “I would consider buying some apples,” “I’d like to buy some apples,” and “I might buy some apples”; 1 = strongly disagree, 7 = strongly agree; Cronbach’s $\alpha = 0.954$; Dodds *et al.*, 1991). And then, participants were also asked to rate the physical attractiveness of the apple (e.g., “less beautiful,” “ugly,” “unattractive”; 1 = strongly disagree, 7 = strongly agree; Cronbach’s $\alpha = 0.933$; Grewal *et al.*, 2019; Mookerjee *et al.*, 2021). Finally, participants reported basic demographic information and guessed the purpose of the experiment.

5.1.2 Results and Discussion. Manipulation check. None of the participants could guess the purpose of this experiment. The results showed that the score of produce appearance was significantly higher than the scale midpoint (4) ($M = 4.75$, $SD = 1.85$; $t(137) = 4.77$, $p < 0.001$), suggesting that participants consistently rated produce in the picture as unattractive. In addition, there was no significant difference in unattractiveness rating between the “natural” label condition ($M = 4.62$, $SD = 1.85$) and the control condition ($M = 4.88$, $SD = 1.86$; $F(1, 136) = 0.71$, $p = 0.401$). Thus, manipulation of unattractiveness of produce was effective.

Purchase intention. Taking purchase intention as the dependent variable, as we expected, the results of one-way ANOVA showed that participants were more willing to buy unattractive produce with a “natural” label ($M = 4.33$, $SD = 1.92$) than those without specific labels ($M = 3.32$, $SD = 1.71$; $F(1, 136) = 10.68$, $p = 0.001$, $\eta^2 = 0.073$). Furthermore, to exclude the influence of other demographic variables on the experimental results, the age and gender of participants were taken as covariables to analyze the labeling effect of low-attractive produce again. The results show that the main effect of “natural” labeling was still significant ($F(1, 134) = 11.02$, $p = 0.001$, $\eta^2 = 0.076$), but age ($F(1, 134) = 1.38$, $p = 0.242$) and gender ($F(1, 134) = 0.08$, $p = 0.776$) have no effect on consumers’ purchase intention.

5.2 Study 1B

To further improve the external validity of this study, we use images of multiple unattractive produce in study 1B, which are from real shopping scenarios (see Figure 2), and again verify the positive impact of the “natural” label.

5.2.1 Method. In study 1B, one hundred thirty-seven participants ($M_{age} = 29.52$ years, 52.6% female) were randomly assigned to one of two (unattractive produce: “natural” labeling vs. no specific labeling) between-subjects conditions. Similar to procedures of study 1A, we manipulated the label attached to unattractive apples: “Natural’ Apple” in the “natural” label condition versus “Apple” in the control condition. Then, participants completed the same measurement questions related to consumers’ purchase intention (Cronbach’s $\alpha = 0.958$) and unattractiveness manipulation check (Cronbach’s $\alpha = 0.917$) as in study 1A.

5.2.2 Results and discussion. Manipulation check. All participants failed to guess the purpose of this experiment. As predicted, we found that participants consistently rated produce in the picture as unattractive, and the unattractiveness index of produce was well above 4 ($M = 4.65$, $SD = 1.57$; $t(136) = 4.86$, $p < 0.001$). We also found no significant difference in the “natural” label condition ($M = 4.51$, $SD = 1.50$) and the control condition ($M = 4.80$, $SD = 1.64$; $F(1, 135) = 1.10$, $p = 0.30$). Thus, manipulation to produce unattractiveness is successful.

Purchase intention. As expected, participants reported a significantly higher likelihood to

purchase “natural” labeled produce ($M = 5.34$, $SD = 1.28$) than unlabeled produce ($M = 3.55$, $SD = 1.60$; $F(1, 135) = 52.59$, $p < 0.001$, $\eta^2 = 0.280$). Also, after accounting for these control variables—age, gender, educational level, occupation, monthly income, the main effect of the “natural” label is still significant ($F(1, 130) = 51.40$, $p < 0.001$, $\eta^2 = 0.283$), but these control variables have no influence on purchase intention (all $ps > 0.1$).

6 Study 2: the mechanism of tastiness and healthiness perception

Study 2 has two objectives. We replicate the main effect of the “natural” label. Then, we test the proposed mediating effects of tastiness and healthiness perception in the above development.

6.1 Method

One hundred thirteen participants ($M_{\text{age}} = 28.01$ years, 66.4% female) were randomly assigned to one of two (unattractive produce: “natural” labeling vs. no specific labeling) between-subjects conditions. In study 2, we replaced our stimuli with unattractive carrots. Similarly, participants were shown pictures of produce whose outward shapes deviated moderately from normal produce (see Figure 2). In the “natural” label condition, we set the carrot label with “Natural Carrot”; in the control condition, we simply set the label with “Carrot”. Afterward, participants indicated their likelihood of purchasing unattractive carrots along with three items. We used the same items to measure purchase intention (Cronbach’s $\alpha = 0.953$) as in study 1A. Next, we measured participants’ tastiness perceptions (e.g., “tasty”, “flavorful”, “juicy”; 1 = “strongly disagree” to 7 = “strongly agree”; Cronbach’s $\alpha = 0.932$; Cooremans and Geuens, 2019; Mookerjee *et al.*, 2021) and healthiness perceptions (1 = unhealthy/low in nutritional value/lack of vitamins, 7 = healthy/high in nutritional value/full of vitamins; Cronbach’s $\alpha = 0.916$; (Cooremans and Geuens, 2019; Mookerjee *et al.*, 2021) with three items respectively. Then, We measured the alternative explanation of safety concerns with four items (i.e., “The pictured produce is not safe,” “The pictured produce is dangerous,” “The pictured produce will make me sick,” and “The pictured produce is harmful to me”; 1 = strongly disagree, 7 = strongly agree; Cronbach’s $\alpha = 0.957$; Grewal *et al.*, 2019). Finally, participants completed a 3-item

manipulation check question (Cronbach's $\alpha = 0.906$) regarding produce unattractiveness as in study 1A. And then, participants provided demographic information and guessed the purpose of this study.

6.2 Results and discussion

Manipulation check. None of the participants could guess the purpose of this experiment. For unattractiveness, the produce was perceived as less beautiful since participants' rating on produce appearance was significantly higher than the scale midpoint (4) ($M = 5.08$, $SD = 1.67$; $t(112) = 6.86$, $p < 0.001$). What's more, in both the "natural" label condition ($M = 4.78$, $SD = 1.69$) and the no-label condition ($M = 5.28$, $SD = 1.68$), the evaluation of unattractive produce was more than 4. There was no significant difference between the two conditions ($F(1, 111) = 2.51$, $p = 0.116$). Therefore, manipulation of the unattractiveness of produce was successful.

Purchase intention. According to the results of one-way ANOVA on purchase intention, we again observed that "natural" labeling has a positive main effect on purchase intention. As we predicted, participants' purchase intention was significantly higher for unattractive produce with the "natural" label ($M = 4.84$, $SD = 1.56$) than those without specific labels ($M = 3.52$, $SD = 1.69$; $F(1, 111) = 18.62$, $p < 0.001$, $\eta^2 = 0.144$).

Mediation. We confirmed that unattractive produce with a "natural" label ($M = 4.92$, $SD = 1.50$) was perceived as tastier as compared to those with no specific labels ($M = 4.07$, $SD = 1.46$; $F(1, 111) = 9.34$, $p = 0.003$, $\eta^2 = 0.078$). Similarly, healthiness perception of unattractive produce was higher in the "natural" label condition ($M = 5.13$, $SD = 1.42$) than in the control condition ($M = 4.13$, $SD = 1.41$; $F(1, 111) = 14.37$, $p < 0.001$, $\eta^2 = 0.115$).

Next, to test whether tastiness and healthiness perceptions mediated the effect of "natural" labeling on purchase intention, we used a parallel mediation analysis (Model 4) (Hayes, 2017) with 5,000 iterations. As we predicted, the results showed that tastiness perception had a relatively weaker mediating effect ($b = 0.31$, $SE = 0.17$, 95%CI [0.047, 0.733]), and healthiness perception had a stronger mediating effect ($b = 0.60$, $SE = 0.23$, 95%CI [0.239, 1.169]), indicating that unattractive produce with the "natural" label increases consumers' tastiness and healthiness perceptions, which results in higher purchase intention. However, we found that safety concerns did not have a mediating effect (95%CI [-0.092, 0.698]), thus ruling out the

safety concerns as an alternative explanation.

Study 2 again confirmed that “natural” labeling could significantly affect consumers’ purchase intention of unattractive produce. More importantly, it demonstrated that perceived taste and health play a mediating role in the above effect.

7 General discussion

7.1 Conclusions

We found that unattractive produce with the “natural” label (vs. no specific labels) increased consumers’ tastiness perception (Pilot study A) and also improved consumers’ healthiness perception (Pilot study B). In study 1A and study 1B, the results showed that “natural” labeling could effectively increase consumers’ purchase intention of unattractive produce. Study 2 further revealed the underlying mechanism of tastiness and healthiness perception. “Natural” labeling was demonstrated that it could alter consumers’ negative stereotypes and cognitive deviation on unattractive produce and optimize consumers’ tastiness and healthiness perceptions, thus increasing their purchase intention.

7.2 Theoretical contributions

Our research makes several theoretical contributions. First, our work highlights the literature on food waste, which has been widely concerned by many scholars and stakeholders in society. Despite previous studies, we find that adding the “natural” label to unattractive produce aids consumers to pay attention to the healthy essence rather than misshapen appearance or its biased association, such that it would effectively increase consumers’ purchase intention of unattractive produce.

Second, our research broadens the application of consumer lay belief theory in the agricultural products field. In contrast to previous studies that focused on the negative or positive effects separately brought by lay beliefs, our research explores more nuanced perspectives concerning how contradictory beliefs interact and impact consumers’ perceptions of food tastiness and healthiness. Specifically, consumers take unconventional aesthetics as a signal of tastiness and healthiness via “natural” labeling. As a result, consumers correct their

biased attitudes toward unattractive produce and form a rational belief in the produce.

Moreover, regarding agricultural products, individuals are probably more concerned about health and safety than appearance. The “natural” label would help sidestep the perceived health and taste tradeoff that may deter consumers from choosing healthy produce and boost perceived tastiness while enhancing perceived healthiness simultaneously. That is, this research serves as evidence that health and taste attributes might be compatible in this given situation.

Furthermore, the findings add to the current understanding of the cue utilization theory. Previous literature showed that people had assumed that beautiful things are equal to good things (Hoegg *et al.*, 2010). However, in the domain of agricultural products, appearance may not be the most important factor affecting people’s decision-making, and people are more concerned about the health and safety aspects of products. Our results show that the “natural” label can also serve as an informational cue in changing consumers’ attitudes.

7.3 Managerial implications

This research also provides many managerial implications. It is noticeable that a large amount of produce is ruthlessly discarded and wasted around the globe, resulting in unsustainable consumption behavior, harming long-term business development, and breaking the harmonious relationship between humans and nature (Laukkanen *et al.*, 2022). Therefore, increasing the purchase of unattractive produce can be considered a possible and sustainable way to enhance food consumption development.

More importantly, our findings provide an easy-to-implement intervention measure with minimum cost for retailers and farmers to deal with and sell unattractive produce in terms of long-term and sustainable development, which plays an important practical significance in reducing food waste and environmental pollution. Especially for small farmers, using the “natural” label appeal makes their produce more acceptable and would avoid suffering a substantial loss.

Finally, it gives managers guidance regarding whether and how to label unattractive produce. Specifically, unattractive produce mentioned in our research refers to products that do not meet the public aesthetic standards in natural growth. It is only for these produce that

adding “natural” labels has a long-term positive effect on consumers’ willingness to buy. If retailers arbitrarily add “natural” labels to distorted produce to make short-term profits, it will not only damage their reputation but also hurt consumers’ trust in them.

7.4 Limitations and future research

There are a few limitations to our research. But meanwhile, limitations imply interesting avenues for future research. First, as not all consumers share the same experience, lay theories are likely to vary across individuals and cultures (Irmak *et al.*, 2011). Naturalness attribute is a critical aspect for produce in the concept of most consumers under the background of oriental culture. However, the perceived importance of this attribute may vary across different countries and cultures (Román *et al.*, 2017). The generalizability of findings regarding the role of “natural” labeling on unattractive produce remains further examination in different cultural contexts (Campos *et al.*, 2022).

Another limitation of this research is that the visually “normal and standardized” produce was not considered. Although this study has examined the effectiveness of “natural” labels on low-attractive produce through several experiments, in real-life consumption scenarios, consumers are often exposed to both normal and low-attractive produce. Therefore, future researchers are encouraged to examine the effects of “natural” labels on regular produce, which helps to broaden our research conclusions and deepen the understanding of the effects of “natural” labels.

At last, all three studies in our research were online experiments. Field experiments can be carried out in the future to improve the generalization of the research results. For example, cooperation with retailers selling produce can be considered to test the effectiveness of this strategy of adding “natural” labels to low-attractiveness produce.

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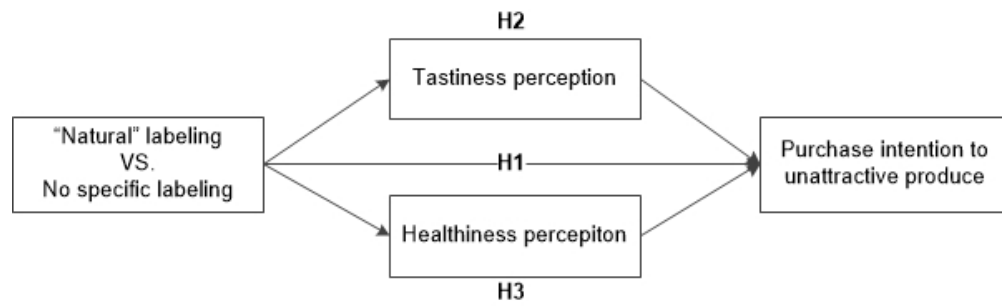


Figure 1.

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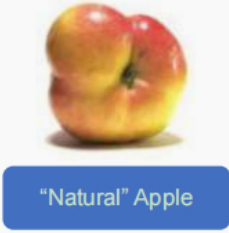
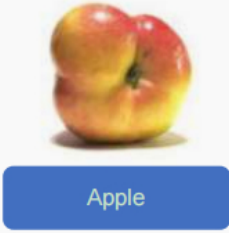
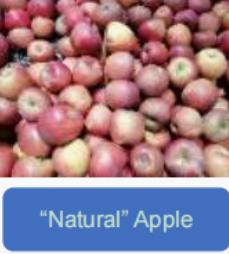
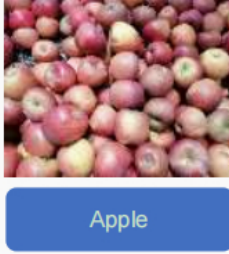
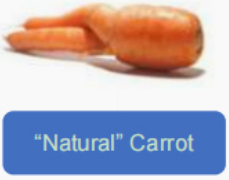
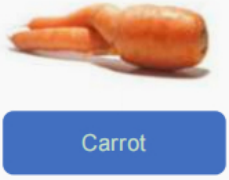
Pilot study A and B		
Study 1A		
Study 1B		
Study 2		

Figure 2.

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