



# Ugly food, not eat: the eating intention of emotional eater for different esthetic food

Chenjing Wu<sup>1</sup> · Xiaoling Liang<sup>1</sup> · Kaili Zhao<sup>1</sup> · Hongyan Zhu<sup>1</sup> · Chuangbing Huang<sup>1</sup> · Siyue Zhang<sup>1</sup> · Fuqun Liang<sup>1</sup> · Xianyou He<sup>1</sup>

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## Abstract

**Background** Emotional eaters eat to relieve their emotions. However, food also contains esthetic information. People generally perceive ugly food as unhealthy and unpalatable. Does the esthetic information of food influence an emotional eater's desire for food in a negative emotional state? In particular, do they have the same lower eating intentions for low esthetic food as non-emotional eaters?

**Objective/Design/Measures** Based on these questions, the present study examined whether the esthetic value of food influences emotional eaters' desires for food. The experiment used a 2 (eating type: emotional eating vs. non-emotional eating) × 2 (food style: high esthetic vs. low esthetic) mixed experimental design. We measured the emotional and non-emotional eaters' eating intentions for different esthetic foods when experiencing negative emotions.

**Results** The results showed that emotional eaters have higher intention to eat high esthetic foods. However, they did not have a high eating intention for all foods, and their eating intention did not differ from that of non-emotional eaters when faced with low esthetic food.

**Conclusion** In conclusion, food esthetic value can affect individual eating intentions. Even for emotional eaters who are in a negative mood, they also did not have a higher eating intention for low esthetic food compared with no-emotional eater.

**Level of evidence** Level II: controlled trial without randomization.

**Keywords** Food esthetic · Eating intention · Emotional eater · Negative emotion

## Introduction

Emotional eating is a type of eating that responds to a range of negative emotions, such as anxiety, depression, anger, and loneliness. Previous research has shown that emotional eating is a poor emotion regulation strategy [1–3]. It is commonly believed that when confronted with emotional events, emotional eaters cannot effectively use emotion regulation strategies, and only eat to diminish negative emotions [4–8]. For example, when faced with negative emotions, emotional eaters increase their food intake [3, 9]. Researchers have also suggested that the food preferences of emotional eaters

point to some special food. For example, Nguyen-Michel et al. (2007) points out that emotional eating individuals often consume “high-calorie or high-carbohydrate food” [10]. A study of eating patterns in adolescents and adults found that, emotional eating was associated with a higher intake of oleaginous fruits (e.g., peanuts) and cakes, pastries, and biscuits.

Consumers often make inferences about food and make decisions based on the esthetics of the food [11]. In the food consumption process, consumers frequently evaluate and choose production based on a product's appearance [12–15]. For example, a perfectly formed apple may be perceived as beautiful, and since what is perceived as beautiful is perceived as good, esthetic beauty may lead people to infer that the apple has other positive qualities (e.g., tastes good), which is similar to the halo effect [16]—a process whereby an initial global positive affective reaction (elicited by prettiness) spills over onto the judgment of other, entirely unrelated attributes.

✉ Xianyou He  
xianyouhe@163.com

<sup>1</sup> Key Laboratory of Brain, Cognition and Education Sciences, Ministry of Education, School of Psychology, Center for Studies of Psychological Application and Guangdong Key Laboratory of Mental Health and Cognitive Science, South China Normal University, Guangzhou 510631, China

The esthetic value is important information for food [17]. Previous studies have suggested that consumers respond positively to a high esthetic value appearance [18] and prefer products with enhanced esthetics [14]. People have a high preference for taste when food is visually more attractive [19]. When food is plated as more attractive, consumers also prefer to eat and pay more money [20]. Consumers even tend to avoid ugly food [21–23]. Hagen (2020) proposed that prettier food is perceived as healthier because its classical esthetic features make it appear more natural [24]. People judge beautiful versions of the same food as healthier (e.g., with more nutrients and less fat content). In summary, the esthetic of food is important for food choice.

Therefore, we raised the question of whether food esthetic affects the eating intention of an emotional eater feeling negative emotions. No study has examined how the esthetic value of food affects the eating intention of an emotional eater. Therefore, we mainly explored the eating intentions of emotional and non-emotional eaters regarding different esthetic foods.

## Materials and methods

### Study design

The experiment used a 2 (eating type: emotional eating vs. non-emotional eating)  $\times$  2 (food style: high esthetic vs. low esthetic) mixed experimental design. The participants were required to evaluate foods with different esthetic values (within-subject factor). The dependent variable was the rating score of eating intention. The study protocol was approved by the Ethics Committee of South China Normal University SCNU-PSY-2020-4-049.

### Participants

We determined the required sample size for the experiment using G\*Power 3.1. We estimated the effect size of the experiment to be small ( $\eta^2 = 0.05$ ). Accompanying an  $\alpha$  of 0.05 (two-tailed) and a power of 0.90, the required participants for the experiment were 44. We recruited 153 participants (61 males and 97 females,  $M_{age} = 22.401$ ,  $SD = 2.638$ ) through online recruitment. They were invited to complete the Dutch Eating Behavior Questionnaire. After collecting the corresponding emotional eating

scores, we chose participants with high and low scores according to the pre- and post-27% grouping method and invited them to participate in further experiments. The 27% pre- and post-percentage grouping method is one of the most common methods of classifying high and low groups in psychology [25], it was mainly obtained by taking a frequency count of all the subjects' scores and extracting the top 27% of the highest scores and the bottom 27% of the scores as the high-scoring and low-scoring subgroups, respectively. Finally, 46 participants were in the emotional eating condition ( $> 3$ ) and 45 participants were in the non-emotional eating condition ( $< 2.08$ ).

All participants signed an informed consent form before the start of the study. Ethical approval was obtained from the Institutional Ethics Committee.

## Stimuli

### Food images

First, we choose a total of 20 color photographs of the foods (10 category) with white background and downloaded from a free and public photo website (<http://baidu.com/>). Each food category contains two photographs, one photographs of a high esthetic food and one photographs of a low esthetic food. These foods are common in Chinese eating environments. All food photographs were cropped to fit a  $500 \times 300$  pixel frame using Photoshop CS6 (Adobe Systems Software Ireland Ltd, USA). Then, we selected a separate group of 16 participants aged 18–30 years (12 females and 4 males,  $M_{age} = 23.56$ ,  $SD = 3.52$ ) to assessed these foods, again. For each image, the participants rated their esthetic value and familiarity on a 7-point scale. For esthetic value, “1” indicated “not at all beautiful” and “7” indicated “extremely beautiful.” For familiarity, “1” indicated “not at all familiar” and “7” indicated “extremely familiar.” Such subjective ratings are relatively common in esthetic research [17, 26, 27]. The result showed that the foods of high esthetic group have a higher esthetic score than the foods of low esthetic group. Images were equated for the degree of familiarity between foods with high esthetic value and low esthetic value (Table 1). Two sample food images are shown in Fig. 1.

**Table 1** The mean scores of food on the degree of esthetic value and familiarity

	Food esthetic value		<i>t</i>	<i>p</i>	95% CI		Cohen's <i>d</i>
	High	Low			Lower	Upper	
Esthetic value	6.41 $\pm$ 0.91	3.90 $\pm$ 1.12	15.84	<0.001	2.17	2.85	3.98
Familiarity	7.13 $\pm$ 0.67	6.69 $\pm$ 1.15	1.91	0.08	– 0.05	0.93	



Food with high aesthetic value      Food with low aesthetic value

Fig. 1 Examples of the food photographs

### Dutch eating behavior questionnaire

The scale is divided into three main sections: restrictive eating, emotional eating, and external eating subscales. The Restrictive Eating Subscale contains 10 items, the Emotional Eating Subscale contains 13 items, and the External Eating Subscale contains 10 items. In this study, we use the Emotional Eating Subscale. Individuals were rated according to frequency, and there were five levels (1 = never; 2 = occasionally; 3 = sometimes; 4 = often; and 5 = always). For example, “When you are angry, do you have the desire to eat?” (Emotional Eating,  $\alpha = 0.923$ ) [28, 29]. Higher scores indicate a higher propensity to engage in emotional eating, and the internal consistency coefficient for its emotional eating scale was 0.94 [29].

### Procedure

Before the start of the experiment, we asked the participants to complete a questionnaire with demographic information (gender and age), ratings of hunger, and the basic eating intention. Then, participants with emotional eating and no-emotional eating who were chosen according to the questionnaire were first instructed to remember the things making them sad, and to describe the things and feelings in writing.

Participants rated how intensely they had experienced negative emotions on a 7-point scale (1 = very negative, 7 = very positive). Next, the participants were shown the food photographs one-by-one and the order of the food pictures is fixed. When food photographs were presented, participants were asked to rate their eating intention, “How much do you wish to eat the food right now?” on a 9-point

scale; “1” indicates a complete lack of desire to eat the food and “9” indicates the maximum desire to eat the food.”

### Results

After emotion induction, we used descriptive statistics in SPSS to count participants’ emotions and found that the rating score of emotion in the negative condition was  $M = 3.25$ ,  $SD = 1.47$ . The independent sample *t*-test results showed that the emotions of the non-emotional eaters ( $M = 3.49$ ,  $SD = 1.44$ ) and emotional eaters ( $M = 3.02$ ,  $SD = 1.48$ ) were not significantly different [ $t(90) = -1.53$ ,  $p = 0.13$ ].

We also compared the basic profiles of the different groups using independent sample *t*-tests. The results showed that the ages of non-emotional eaters ( $M = 22.63$ ,  $SD = 2.27$ ) and emotional eaters ( $M = 21.87$ ,  $SD = 1.93$ ) were not significantly different [ $t(90) = -1.71$ ,  $p = 0.09$ ]. The chi-square test showed that there was a significant difference between the number of male and female participants in the conditions of high and low esthetic environments ( $p < 0.05$ ). The hunger between emotional eaters ( $M = 4.76$ ,  $SD = 1.51$ ) and non-emotional eaters ( $M = 5.47$ ,  $SD = 2.11$ ) was not significantly different [ $t(90) = -1.84$ ,  $p = 0.07$ ]. The basic eating intention for non-emotional eaters ( $M = 5.36$ ,  $SD = 2.40$ ) and emotional eaters ( $M = 5.54$ ,  $SD = 1.80$ ) was not significantly different [ $t(90) = 0.42$ ,  $p = 0.67$ ].

We used an RM-ANOVA to examine the effect of different types of eaters and different esthetic foods on eating intentions, with gender as the control variable. The results showed that the main effect of food style on eating intention was significant,  $F(1, 90) = 41.16$ ,  $p < 0.001$ ,  $\eta^2 = 0.32$ . The eating intention toward high esthetic foods was higher than toward low esthetic foods. Meanwhile, emotional eaters showed higher eating intentions than non-emotional eaters for both high esthetic food and low esthetic food,  $F(1, 90) = 5.15$ ,  $p = 0.03$ ,  $\eta^2 = 0.06$  (see Table 2). The results showed that the interaction effect was significant [ $F(1, 90) = 6.76$ ,  $p = 0.01$ ,  $\eta^2 = 0.07$ ] (see Fig. 2). For high esthetic food, emotional eaters had much more intention to eat than non-emotional eaters, but for low esthetic food, there was no significant difference between emotional and non-emotional eaters.

Table 2 The mean rating scores of eating intention under negative emotions

Food type (esthetic value)	Eating type		<i>t</i>	<i>p</i>	95% CI		Cohen’s <i>d</i>
	Emotional eating	No-emotional eating			Lower	Upper	
High	53.46 ± 10.69	45.22 ± 15.04	3.02	0.003	2.81	13.66	0.63
Low	32.61 ± 12.45	28.84 ± 12.39	1.45	0.15	-1.41	8.94	

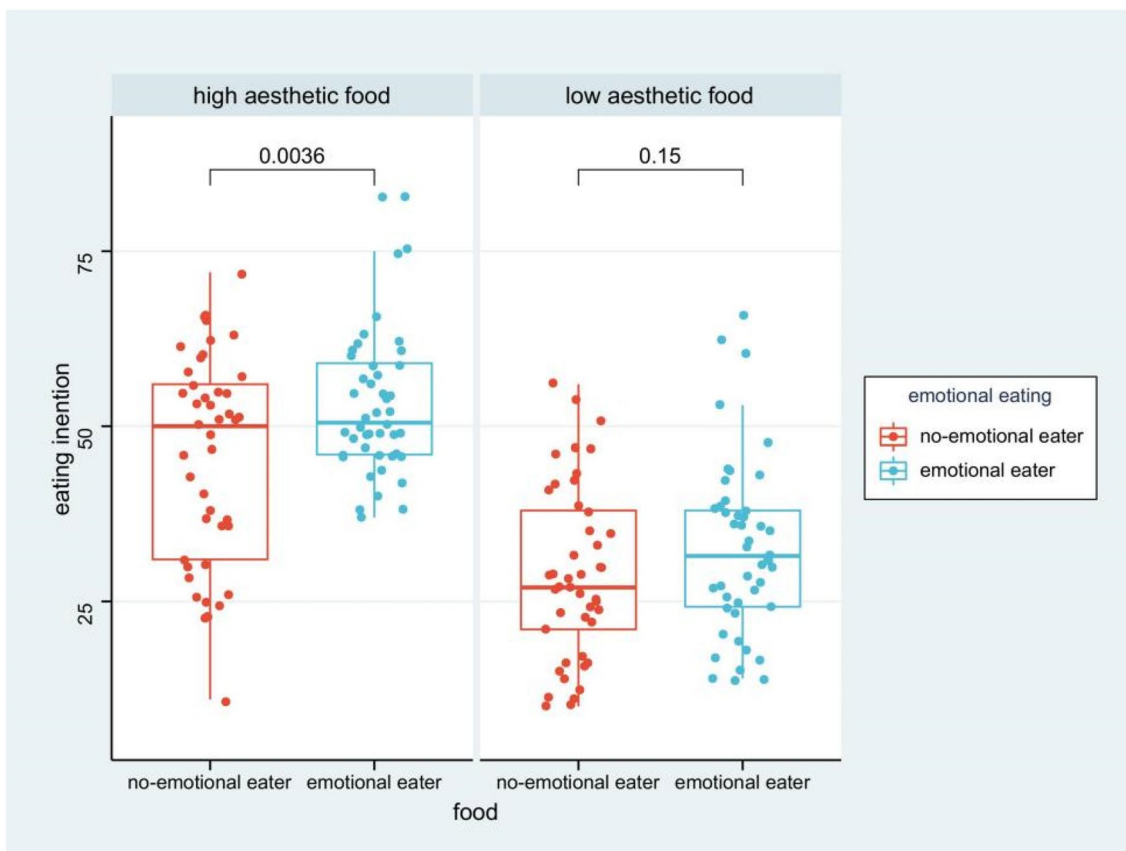


Fig. 2 The interaction effect between food type and eating type

Table 3 The correlation between the score of emotional eating and the food intention

	High esthetic food	Low esthetic food
Emotional eating	0.39**	0.23*

\*\*Stands that the correlation is significant at the 0.01 level (2-tailed)

\*Stands that the correlation is significant at the 0.05 level (2-tailed)

**The relationship among the score of emotional eating and eating intention**

We used partial correlation analysis to examine the relationship between the score for emotional eating and high esthetic food and between the score for emotional eating and low esthetic food, using gender as the control variable. The results indicated that the emotional eating score was positively associated with the intention to eat high esthetic food and low esthetic food see Table 3.

We also used regression analysis to examine the relationship between the score of emotional eating and high esthetic food and between the score of emotional eating and low esthetic food using gender as the control variable. The score of emotional eating significantly predicted eating intentions for high esthetic food ( $R^2=0.15, \beta=0.39, Y=36.55+0.39x, p<0.001$ ) and also significantly predicted eating intentions for ugly esthetic food ( $R^2=0.06, \beta=0.24, Y=23.31+0.24x, p=0.02$ ).

**Discussion**

The current experiment aimed to explore the effect of food esthetic value on intentions to eat food for emotional eaters in a negative emotional state. The results showed that the eating intentions of emotional eaters were higher than those of non-emotional eaters. This result is consistent with previous studies that demonstrated a higher intention to eat when

individuals are in a negative mood [30–32], and documented how individuals consume unhealthy but hedonically rewarding foods as a coping strategy to alleviate their negative feelings [33, 34]. Emotional eating is assumed to serve as an attempt to regulate undesired emotions [35–38].

We found that the esthetic value of food influences emotional eaters' intentions to eat. The results found a higher eating intention for high esthetic value food under negative emotions. Meanwhile, the higher the emotional eating score, the higher the eating intention for highly esthetic food. Previous researchers have found that individuals tend to consume healthy food when in a positive state, and negative emotions promote the consumption of junk food [39–44]. For example, participants in negative states were more likely to choose food with high fat and calorie content [45]. High esthetic food was healthier [24], but we did not find that individuals in negative moods had a higher intention to eat foods of low esthetic value (lower health), which differs from previous findings. This may be because things with a high esthetic value can produce positive emotions [46]. In a negative mood, high esthetic food has a positive alleviating effect on individuals in a negative mood. Therefore, individuals with negative emotions have a higher intention to eat high esthetic foods. In addition, high esthetic food also creates positive expectations of food (good taste and healthier) [47]. For example, a beautiful apple may also lead people to perceive it as having better qualities (good taste) because of its beauty, thus triggering higher consumption behavior [47]. Therefore, individuals have a higher intention to eat esthetic foods. For low esthetic foods, emotional eaters did not differ significantly from non-emotional eaters in their intention to eat. This may also be because low esthetic foods contain a lot of unsafe and unhealthy information [24]. Not only do people perceive food as unpleasant, but its ugly appearance causes emotional eaters to feel more uncomfortable, so emotional eaters do not show a higher intention to eat ugly food.

In conclusion, the results do not agree with our common belief that emotional eaters use food to relieve their emotions. Emotional eaters do not have a choice about food when they experience negative emotions. The esthetic information of food is a very important factor. Even feeling negative emotions, individuals still have different eating intentions when facing the same type of food, but with different esthetic values. Previous studies have suggested that emotional eaters have a higher preference for high-calorie foods [10]. According to the results of this study, we think that emotional eaters choice of food is not only based on physical information, such as the quantity of heated food and sugar

content; it may also be based on other information (beauty information—beauty can produce positive emotions).

These results also revealed an interesting phenomenon. There was a marginally significant relation between emotional and non-emotional eaters facing low esthetic food. We propose that emotional eaters not only use food to alleviate their emotional states [24]. Although they noticed the corresponding esthetic information of the food when they were in a negative mood, they also had a higher eating intention for low esthetic food, and we suggest that emotional eaters may not just be relieving themselves through the food itself. They may also relieve their emotions through other paths, such as eating and chewing. Chewing is an essential behavior in daily life and is tightly linked to hedonistic (emotional) systems in the brain, which relieves negative emotions [48]. For example, research has explored the relationship between chewing behavior and neurotransmitters, and found that a reduction in chewing behavior could, to some extent, activate monoamine transmitters in the hippocampus and increase negative emotion, inhibiting neurotransmitters in critical areas and increasing the tendency to be anxious [49]. Monoamine neurotransmitters are involved in many physiological activities, such as emotion, arousal, and reward [50]. Moreover, corticosterone is also an indicator of stress response. Previous studies have also reported increased corticosterone secretion in mice with reduced chewing stimuli [51, 52]. Therefore, emotional eaters have a higher intention to eat, even in the face of low esthetic food. Because in negative emotions, even low esthetic food can help alleviate negative emotions by chewing the food, particularly for emotional eaters. This research provides a new understanding of emotional eaters. When emotional eaters experience negative emotions, their desire to eat may not be solely due to indicators, such as calories, sugar, calories, and esthetic information about the food itself, but also to the act of eating itself.

## Strengths and limits

The strength of this study is that it explores the eating intentions of this group in terms of eating disorders-emotional eating. In the selection of esthetically pleasing foods, we have tried to have both low and high esthetically pleasing pictures of the same type of food to control for the effects of calories. In addition, we controlled for the basic desire to eat and hunger levels of each subject, so that there was no difference in the basic physiological state of each subject, which

allowed us to better investigate eating intentions for different esthetic foods. Even so, there are still some shortcomings in the current study. For example, there are relatively few male subjects in emotional eating, and no ideas about the possible gender differences. In addition to this, the foods contained different healthy and unhealthy foods, but their healthy and unhealthy amounts were not entirely consistent.

**Conclusion**

In conclusion, this study found that emotional eaters have choices about the food that they want to eat when feeling negative emotions, and they are affected by the esthetic feeling of food, which provides an understanding of emotional eating.

**What is already known on this subject?**

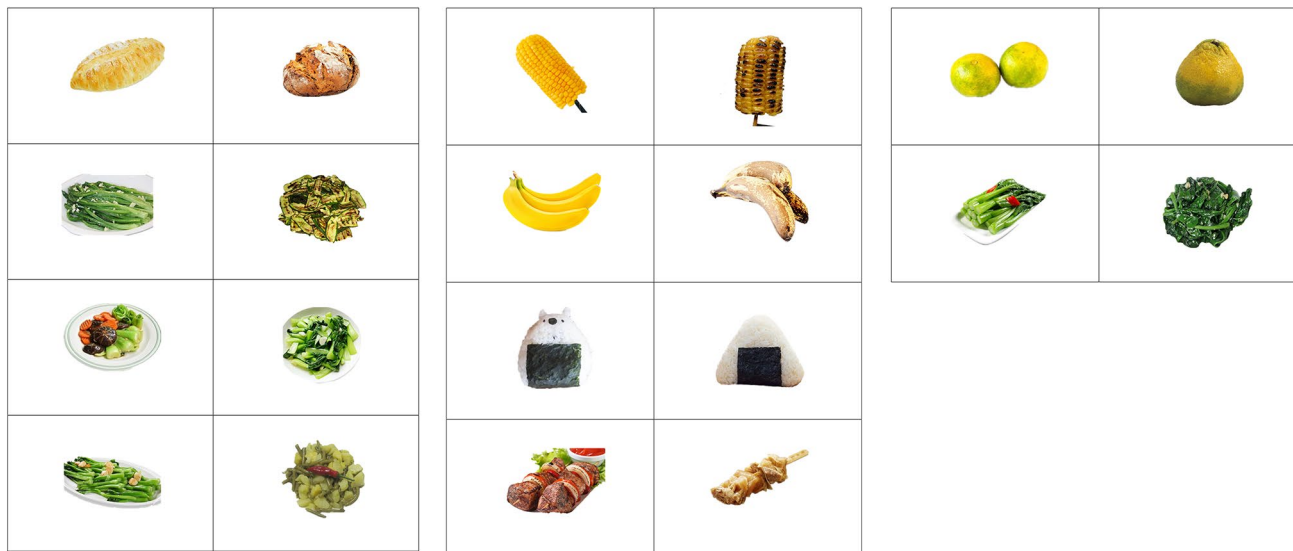
Previous research has found that emotional eaters prefer types of food, such as high sugar and high calories. Food

esthetic is an important factor which influences individual’s perception about food healthy and threatening information, thus influence their intention to eat. As individuals with specific needs for food, do emotional eaters also have different eating intentions for foods with different esthetic values? Based on the question, the study was designed to investigate the eating intentions of emotional eaters toward different esthetic foods in their emotional state.

**What this study adds?**

This study adds our understanding about emotional eaters and reveals that emotional eaters who use food as a tool to alleviate their emotions, also consider food esthetic value and do not consume low esthetic foods. This finding may help emotional eaters to better control their emotional eating behavior—choosing unattractive foods—and to control their eating intentions.

**Appendix**





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**Author contributions** All the authors contributed to the study conception and design. Material preparation was performed by XLL, and HYZ data collection was performed by SYZ, KLZ, and FQL; data analysis was performed by CJW and CBH; data interpretation was performed by CJW, and HYZ. The first draft of the manuscript was written by CJW and XYH. All the authors commented on previous versions of the manuscript. All the authors read and approved the final manuscript.

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**Data availability** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declarations

**Conflict of interest** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Ethical approval** All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all the individual participants included in the study.

**Consent for publication** All the authors consent to the publication of the manuscript in EAWD, should the article be accepted by the Editor in-chief upon completion.

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