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Evaluating Eating Behavior Traits of Virtual Targets: Attitudes and Empathy

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Abstract

There are many common stereotypes related to food consumption and eating behaviors that are considered indicative of one's personal character. Negative evaluations of an individual based on their eating behaviors may lead to stigmatization and other harmful psychosocial outcomes. Using vignette scenarios, we examined 582 participants' attitudes toward two target characters who exhibited bitter food dislike and high reward-based eating drive respectively. In open-ended text responses, participants were more likely to respond negatively and use stigmatizing language when describing the character with high reward-based eating drive versus the character with bitter food dislike. In addition, empathic responses depended on whether participants believed they, themselves, exhibited reward-based eating drive. Participants tended to be more empathetic and more positive towards the target who shared their own reward-based eating behaviors. Interestingly, the same was not true for those who shared bitter food distaste. These results suggest that eating behaviors that are perceived as more controllable and unusual may be more negatively perceived. Targeted education or support to reduce negative attitudes about such traits may be beneficial.

Keywords

eating behavior; stereotypes; stigma; reward-based eating drive; bitter food avoidance; empathy

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Author Contributions

SP conceptualized the project. SP and AJM were involved in designing the study. SR, SP, and AJM were involved in data collection. SR conducted data curation and formal analysis. All authors contributed to the drafting of the project. All authors have approved the final article.

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Author Statement

SR: conceptualization, data curation, formal analysis, writing original draft, review, and editing. AJM: conceptualization, data curation, formal analysis, investigation, methodology, writing original draft, review, and editing. SP: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, supervision, writing original draft, review, and editing.

Declaration of competing interest

None.

Conflict of Interest:

None

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1. Introduction

The belief that what and how a person eats can provide a window into their character is widespread. Observation of other people's eating behaviors can influence a wide range of attitudes and perceptions of that person including those related to health, fitness, body size, attractiveness, intelligence, self-control, gender roles, and morality [1, 2]. These perceptions, in turn, have been associated with broader negative attitudes and stereotypes. For example, perceptions that an individual lacks self-control with respect to eating relates to primary dimensions underlying weight stigma and other forms of body- and health-based stigmatization [3, 4]. Downstream consequences of such stigma can include reduced self-esteem, poorer relationships and job performance, and higher rates of depression and anxiety [5, 6]. Understanding attitudes and stereotypes associated with specific eating behaviors is therefore both of theoretical interest and may also have applied uses for reduction of stigma, public health messaging and policy design. For example, eating behavior traits that are identified as a source of particularly negative attitudes could be evaluated as a potential source of stigma that may require remediation. Evidence generated here could also assist with generating hypotheses about effective messaging approaches and target groups that consider the diversity of dietary habits within the population.

There is a wide and varied literature on stereotypes associated with consumption of specific food types [7]. Some food choice styles such as general healthy eating, eating 'natural' foods, and eating smaller meal sizes are associated with more positive attitudes about the target individual [8–10]. Other food choice styles such as vegetarianism/veganism and high-fat diets are viewed more negatively [11–13]. As opposed to general eating styles, basic eating behavior traits such as reward-based eating, taste perception, satiety response, and eating in the absence of hunger have rarely been studied in this way. The exception is picky eating and reluctance to try new foods which have been associated with negative evaluations and stigmatization across multiple studies [14, 15]. Food addiction has also been linked with negative evaluations and social distancing [16]. In general, the existing literature supports the notion that many eating behavior traits engender specific attitudes toward those who exhibit them, and in some cases to be associated with social devaluation. The current work extends this investigation to two eating traits which have not yet been evaluated as to the attitudes they might engender, reward-based eating drive and distaste for bitter foods. Reward-based eating drive refers to a state wherein an individual experiences preoccupation with food, lack of control overeating, and a lack of satiety when eating [17]. Distaste for bitter foods involves sensitivity to compounds in certain foods that can taste very bitter to some individuals as well as avoidance of foods containing those compounds [18]. Both are caused by gene-environment interactions [19, 20] and likely tie in with the broad and pervasive social stigma against individuals with higher weight. These traits are of interest in part because their characteristics overlap with drivers of stigma and negative attitudes in other conditions. Reward-based eating drive may evoke notions of poor willpower and lack of self-control in its tendency to reinforce eating of hyperpalatable foods. While bitter food avoidance can be considered more uncontrollable as it relates to tastebud perception, it also mirrors some aspects of picky eating in terms of limiting intake of certain healthy foods. While these two eating behavior traits are different on multiple dimensions (e.g.,

whether they relate to food approach versus avoidance), their direct comparison can provide preliminary evidence that these constellations of characteristics are perceived in meaningful ways and do actually result in distinct, differential attitudes as opposed to being considered under a single umbrella of unhealthy eating behaviors [21]. These specific behaviors are also of interest because they are relatively common [22, 23], enabling us to address our other aim, assessing the role of perceiver characteristics on attitude formation.

Although it is possible to identify common attitudes and character associations toward particular eating styles, these attitudes also vary based on the perceiver's characteristics. One of the most reported moderators is whether and to what extent an individual engages in the focal eating behavior themselves [8, 24]. For example, individuals who eat a higher-fat diet endorsed more positive attitudes toward others with a high-fat diet than those who eat a lower fat diet [11]. This pattern is consistent with several psychological theories and empirical work suggesting that people tend to see their own worldview and experiential perspective as normative [25]. As such, someone who displays eating behaviors that are similar to our own is likely to be viewed as a more empathetic target [26] and less deserving of negative evaluation and stigma. It is important to note that these empathetic feelings and positive attitudes appear to be constrained to the eating behavior in question. For example, Jordan and colleagues [15] found that individuals who reported picky eating themselves exhibited lower levels of stigma toward other picky eaters but greater levels of stigma towards many other eating behavior styles. Although it remains possible that individuals with specific eating behaviors may feel empathetic towards others who also struggle with eating, even if their struggles differ somewhat from their own; to date, evidence of this is lacking.

In the current study we explore attitudes towards vignette characters who exhibit specific eating behaviors. We investigate whether these attitudes vary based on the specific eating behavior in question and we explore potential influence of the participant/perceiver's own eating behaviors. Specifically, we measure attitudes and empathy towards characters who exhibit bitter food dislike and reward-based eating. We address two research aims. 1. To compare attitudes and empathy toward a target person who dislikes bitter food with those toward a person with high reward-based eating drive. 2. To test whether individuals who self-identify as having a specific eating behavior trait will have fewer negative attitudes and higher levels of empathy toward a target person who also exhibits a similar trait.

We pre-registered our research questions with AsPredicted¹. No specific hypotheses (only research aims) were pre-registered. (https://aspredicted.org/ZLV_QS5).

2. Materials and Methods

2.1 Participants and Procedure

Data were collected as part of a larger research program investigating the impact of video-based genetics education on eating behaviors. The study was judged to be exempt

¹We pre-registered a third research question. Namely, "Do underlying beliefs about individual agency and control over-eating behaviors predict the public's attitudes and empathy towards people with a predisposition towards obesogenic eating behaviors?". This question falls outside the scope of the current report. As such, we report results of this hypothesis test only in supplemental materials.

by The Office of Human Subjects Research Protections at the National Institutes of Health. Participants were recruited via the research-focused online crowd-sourcing platform Prolific (<https://prolific.co/>). The survey was open to all adults on the platform. Relevant to this specific study, following a short pre-test questionnaire, participants watched vignette scenarios depicting two fictional people engaging in specific eating behavior styles and then reported their attitudes towards these target characters. As part of the larger research program, participants were randomly allocated to watch an educational video or a control video before watching the vignette scenarios and either watched these scenarios from the perspective of the first or third person. The bitter food scenario always preceded the hyperpalatable food scenario. Following each vignette scenario, participants completed open-ended and rating scale measures of their attitudes and empathy towards the target character. The current sample began with 659 participants whose responses were collected through the online survey. Several exclusions were instituted: $n = 55$ who did not pass the audio and video check, $n=1$ for not being able to see or hear videos, $n = 14$ were excluded for indicating there was a reason to exclude their responses in a closed-ended item at the end of the survey, and $n = 7$ who were excluded for entering a height less than 36 inches or greater than 96 inches. The latter two criteria relate to general data quality, detecting participants providing false data or paying insufficient attention to responses. Our final sample consisted of 582 adults.

2.2 Educational Content

The gene-environment interaction educational video module was approximately 5 minutes long and included an explanation of gene-environment interaction generally as well as its influence on eating behavior. The control module was approximately the same length and focused on spicy foods. Assignment to the educational versus control module was included as a control variable in statistical models.

2.3 Vignette Scenarios

Bitter Food Scenario.—In the first vignette scenario, participants watch a video with a voiceover, illustrated with several still drawings of a human target that presented as an individual with a predisposition to highly dislike bitter foods. The individual is drawn in a generic way to avoid ascription of unrelated traits. In the vignette, the target attends a dinner party where the only healthy, non-caloric dense food choices are bitter green vegetables (brussels sprouts, kale). Their friends encourage them to try the green vegetables and they reluctantly do, despite an overwhelming repulsion as a result of their sensitivity to bitter foods. They then move to eat more appealing and unhealthy foods (fried chicken, macaroni and cheese), as they feel compelled to avoid the only healthy options due to their taste.

Hyperpalatable Food Scenario.—In the second scenario, participants watch a video with a voiceover, illustrated with several still drawings of a human target that presented as an individual with a predisposition to be highly attentive to palatable food cues in the environment. The individual is drawn in a generic way to avoid ascription of unrelated traits. The character is doing a repetitive file sorting task in the workplace when a coworker appears with a plate of chocolate chip cookies which they leave on the target's desk. The cookies capture the target's attention making it difficult to engage effectively in the file

sorting task. The target eventually eats all of the cookies on their desk in an attempt to satisfy their craving. See supplemental figure for stills from both videos.

2.4 Measures

2.4.1 Attitude Measures—Participants were asked after each vignette “How would you describe the eating behavior of the [dinner guest/office worker] in the video?” Participants could type a freeform response. These responses were coded by three independent raters for general sentiment (positive, negative, or neutral), stigmatizing language, normalizing language, and health judgement language. The codebook is available in supplemental materials. Fleiss’s kappa’s were calculated to assess the raters’ reliability on 20% of the data set; all kappa statistics reached or exceeded 0.65.

General Sentiment.: Participants’ attitude was coded as positive if they made a supportive, kind or understanding comment, indicating a positive attitude towards the vignette character. Examples of a positive sentiment included: “Polite”, “Kind and benevolent”, and “Perfectly normal! It’s never a bad thing to indulge in your favorite sweets from time to time.” Participants’ sentiment was coded as negative if they made a judgmental, callous, or blaming comment, indicating a negative attitude towards the vignette character. Examples of a negative attitude include: “Obsessed with food”, “Picky”, and “Bad. She likes food that is not good for her body or health.” Participants’ sentiment was coded as neutral, if their comment had no emotional tone or had a balanced ambivalent tone, including positive and negative aspects. Examples of a neutral attitude include: “They tried to eat the greens, but it tastes bitter to them.” and “The person was distracted by the smell of the cookies”.

Health Judgment Language.: Participants’ responses received a “present” code if they described the vignette character’s eating as negatively impacting the character’s health. Examples include “Unhealthy”, “The dinner guest had very bad eating habits that would lead to health issues later in life”, and “They have a poor diet, not having a lot of variety.”

Stigmatizing Language.: Participants’ response was coded as “present” for stigmatizing language if they made a blatant and severe judgment of the character (not just their eating behavior) that would be found stigmatizing. Examples of stigmatizing language are: “Childish”, “Unnatural, and almost grotesque”, “Weak, pathetic, powerless”, “Junky”, and “Desperate”.

Normalizing Language.: Participants’ responses received a “present” code if they used normalizing language that indicated the vignette character’s eating was typical, relatable, or common. Examples include “Pretty normal”, “Common with how many people eat”, and “Typical, it is easy to be distracted by food sometimes.”

2.4.2 Empathy Measures

Self-other Overlap.: The Inclusion of Other in the Self Scale [27] measured how close the participants felt to the vignette character. This scale depicts seven drawings of increasingly overlapping circles, anchored by the first picture of two non-overlapping circles and the seventh picture of two almost completely overlapping circles. The participant was instructed

to “select the diagram that best represents your relationship to the [dinner guest/office worker] in the scenario”. Higher values indicate more perceived overlap.

Empathic Adjectives.: Participants were asked to what extent they were feeling six empathic emotions (tender, softhearted, warm, sympathetic, compassionate, moved) towards the [office worker/ dinner guest] from 1 = None at all to 5= Extremely. [28] ($\alpha = 0.93$).

Dispositional Empathy.: Dispositional empathy was measured using the Empathic Concern subscale of the Interpersonal Reactivity Index [29]. The Empathic Concern subscale assesses feelings of warmth, compassion, and concern for others using 7 items such as “I have tender, concerned feelings for people less fortunate than me.” Participants rated themselves on each item using a 5-point scale (1 = does not describe me well, 5 = describes me very well; ($\alpha = 0.84$).

2.4.3 Eating Behavior Traits

Reward Based Eating Drive.: Participants self-reported their own reward-based eating drive using a shortened version of the reward-based eating drive scale which measures a set of eating tendencies including preoccupation with food, lack of control, and lack of satiation [30]. Participants responded to 5 items indicating the extent to which they agreed that the item described their own eating behavior from 1 =strongly agree to 5 =strongly disagree. Items included “When I start eating, I just can’t seem to stop.” and “Food is always on my mind” ($\alpha = 0.83$).

Bitter Foods Dislike.: Participants self-reported their own bitter food dislike by rating how much they like or dislike 12 bitter foods (arugula, beer, black coffee, black tea, broccoli, brussels sprouts, dark chocolate, grapefruit, kale, radishes, spinach, and bitter foods in general) from 1 = Strongly Dislike to 5 = Strongly Like. For ease of interpretation, all items were reverse coded such that higher values indicate a stronger dislike for bitter foods ($\alpha = 0.76$).

2.5 Statistical Analysis

To ensure data quality and remove invalid data, a series of data quality measures were taken. Before watching the videos participants completed two attention checks where participants were instructed to watch a video and enter a video code and listen to an audio and enter an audio code.

To compare the hyperpalatable food scenario and bitter food scenario, a series of chi-squared tests compared the occurrence of general sentiment, health judgment language, stigmatizing language, and normative language. T-tests compared the scores of self-other overlap and empathy between these two scenarios.

Linear regression and logistic regression models were run to determine whether participants’ language and empathy towards target characters differed depending on participants’ own individualized characteristics relative to the traits featured in scenarios. Separate analyses were run for each dependent measure, controlling for presence versus absence of the educational module, vignette perspective (first vs. third), and participants’ dispositional

empathy (mean = 4.01, SD = 0.79). Given the exploratory nature of our research aims, we used a Bonferroni correction when interpreting the significance of our findings. This conservative approach reduces the likelihood of finding false positive results.

3. Results

3.1 Sample characteristics

The final sample (N = 582) consisted of 253 men, 316 women, and 13 individuals of other genders. Participants' ages ranged from 18 to 74 with a mean of 34.15 (SD = 11.5). 43% of participants reported their weight was "just about right", 36% "overweight", 14% "very overweight", and 7% "underweight" or "very underweight". Based on self-reported height and weight, participants' mean BMI was 27.2 (SD = 7.60).

The racial composition of our sample was 73% White, 11% Asian, 9% Black, and 7% other. Employment status varied (42% Full-time, 18% Part-time, 14% Student, 8% Caretaker/Parent, and 18% Other), as did marital status (34% Married, 51% Single, 7% Widowed/Divorced, 8% Cohabiting). 33% of our sample were parents, and 49% had a college degree.

For participants' self-reported eating behaviors, mean reward-based eating drive was 2.50 (SD = 0.99). Mean bitter food dislike was 2.68 (SD = 0.60). The correlation between the two self-reported eating behaviors was $r = 0.02$ ($p = 0.52$). The correlation between mean reward-based eating drive and BMI is $r = 0.28$ ($p < 0.001$), and the correlation between mean bitter food dislike and BMI is $r = 0.17$ ($p < 0.001$).

3.2 Comparison of Hyperpalatable and Bitter Food Scenarios

When comparing attitudes towards the target character in the bitter food and hyperpalatable food scenarios, a p value $< .008$ was considered significant. General sentiment ratings were significantly more positive for the bitter food scenario than the hyperpalatable food scenario (see Table 1). Participants were significantly more likely to use health judgement language for the bitter food scenario, and stigmatizing language for the hyperpalatable food scenario. There was no difference by scenario in use of normative language. There were also no significant differences by scenario for self-other overlap or empathy ratings.

3.3 Personal Eating Characteristics Predicting Attitudes to Targets

When evaluating the extent to which participants' own eating behavior was related to their attitudes towards the two target characters, a p value $< .008$ was considered significant.

Influence of Participant's Bitter Food Dislike Trait—Dislike of bitter foods was significantly and positively associated with self-other overlap suggesting that participants with greater dislike of bitter foods were more likely to see themselves as similar to the target character in the bitter food scenario. However, dislike of bitter foods was not associated with attitudes or empathy towards the target character of this scenario using a conservative Bonferroni correction. See Table 2.

Reports of participants' bitter food dislike trait were not significantly associated with any of the outcome variables in the *hyperpalatable food scenario*.

Influence of Participant’s Reward Based Eating Drive Trait—Reward-based eating was significantly and positively associated with self-other overlap, suggesting that participants were significantly more likely to see themselves as similar to the target character in the hyperpalatable food scenario. In addition, greater reward-based eating was significantly associated with increased empathy for this target character. Reward-based eating was not associated with any other outcomes in this scenario. See Table 2.

The extent to which participants felt they exhibit reward-based eating was associated with significantly and positively with self-other overlap for the target of the bitter food scenario. No other relationships were significant for the *bitter food scenario*.

4. Discussion

The current work supports the notion that specific eating behaviors are differentially associated with evaluations of the individual who exhibits them. In comparing eating scenarios focused on dislike for bitter foods and on reward-based eating, results suggest that reward-based eating behavior is more negatively viewed across several domains. This study also demonstrated that, at least in some cases, one’s own eating behavior tendencies influence empathy towards others who exhibit the same tendencies. This relationship, again, differs between the two eating behaviors we evaluated.

Turning first to the differences between the two eating behaviors, although the current study is limited in its ability to determine why this difference occurs, examination of each scenario’s characteristics may be instructive. This examination needs to be performed in the context that most participants received education on gene-environment interactions, which potentially influences their perspective on these eating behaviors. This framework may amplify the interpretation of these behaviors as biologically or genetically driven, and concurrently, could diminish the perception of personal willpower as a contributing factor. The bitter food scenario focuses on the experience of tasting bitter compounds in green vegetables; an experience that is likely presumed to be uncontrollable by perceivers. Indeed, previous work has shown that bitter taste avoidance is associated with reduced perceptions of self-efficacy and control [21]. In this case, the experience of taste is partially biologically driven [31], and influenced by characteristics of the foods themselves, neither of which are likely to evoke blame or volition on the part of the actor. The reward-based eating scenario, in contrast, involves the act of eating an unhealthy food when the alternative of not eating the food appears to be viable. This scenario is based more on brain activity and attention which drive an individual to consume a ‘bad’ food. Such a drive might be perceived as ignorable with sufficient willpower. Previous work has shown that individuals are relatively unlikely to consider eating behaviors such as these to have uncontrollable causes (e.g., genetics) and tend to see the behavior as relatively volitional [32, 33]. While some of the difference in response to each scenario may be inherent to the eating behavior itself (bitter taste avoidance versus reward-based eating), there may also be elements that depend upon how the behavior is described and the ‘site’ of the food response (e.g., brain vs. tastebuds). These factors could be more methodically tested to determine how differential framing related to specific eating behaviors is associated with negative attitudes. Such work could inform communication approaches that reduce stigmatization.

Personal eating behavior tendencies influenced responses to the target characters in the eating behavior scenarios, but the response patterns differed between the two scenarios. For bitter food avoidance, individuals who tended to dislike bitter food felt more similarity to the scenario target, but this did not manifest into more favorable attitudes or greater empathy towards the character. This disconnect is reminiscent of patterns exhibited for other stigmatized conditions such as obesity where individuals who are affected often persist in stigmatizing and holding negative feelings about others who share their condition [34]. What the current findings suggest, however, is that people may negatively view others who avoid bitter foods, even if they themselves demonstrate this eating behavior. This is consistent with the notion that consumption of bitter foods (such as green vegetables and coffee) has social value [35]. Their avoidance also shares similarities with pickiness or reluctance to try new foods which carry social costs [14, 15]. Although, like many biologically influenced responses, taste for bitter foods can be acquired to some extent, individuals may overlook the fact that this acquisition is more difficult or perhaps even impossible for some [36]. In general, such negative attitudes may underlie broader social stigma and devaluation associated with this trait, however, more research would be needed to test this possibility.

In the reward-based eating behavior scenario, reporting reward-based eating tendencies was also associated with higher feelings of similarity towards the target character. In this scenario, participants who demonstrated this eating behavior were also more likely to feel empathy towards the target character. There were, however, no differences in the language used to describe the scenario or target. Greater empathy for those who are perceived as more similar to ourselves is a well-documented phenomenon in psychology and is theorized to be a result of both biological [37] and learned [38] processes that encourage social bonding. Greater empathy is normally associated with less stigmatizing and more prosocial attitudes [39], but this was not observed in the current study. This may speak to how ingrained perceptions of weakness or failure of willpower are in relation to reward-based eating [40]. People also frequently underestimate the power of the biological and other uncontrollable factors that underlie and reinforce the behavior. The overall pattern of results for this scenario suggests that reward-based eating does seem to be stigmatized. Although stigma associated with this eating propensity has not been previously identified and more work is required to evaluate its characteristics, it shares qualities with addictive-like eating which has been described as a source of stigma [41].

Reporting high reward-based eating drive oneself was also associated with higher self-other overlap for the target of the bitter food vignette. The converse was not true for people with high bitter foods dislike. There are several mechanisms by which this feeling of similarity might generalize to other groups. First, the target group might be considered part of the same superordinate category [42]. As reward-based eating drive encapsulates several eating behaviors (including preoccupation with food, lack of control, and lack of satiation) those who experience it may more easily associate it with other eating behaviors. Individuals who dislike bitter foods may consider themselves more unique and be less likely to associate themselves with other eating behaviors. Second, this wish to differentiate may be exacerbated to the extent that bitter food distaste is relatively less stigmatized than reward-based eating drive, (e.g., identity management strategy, [43]). Various other factors can influence whether stigma-based solidarity occurs between groups including perceived

controllability, concealability/visibility, and the intersection of multiple identities [44]. These ideas cannot be directly tested in the current study; much more research is needed to establish how and when empathic generalization occurs between groups identifying with different eating behaviors.

Recognizing that stigmatization differs between reward-based eating and bitter food distaste—as does the sense of empathy and connectedness among individuals who share these behaviors—provides an important foundation for the design of stigma reduction strategies and tailored public health messaging. For instance, by understanding the factors that elicit an empathetic response, it becomes possible to develop social support programs. These may include pairing individuals with similar eating habits, which could potentially lead to more effective peer-based initiatives for positive behavioral change.

Additionally, a deeper understanding of the stereotypes and attitudes linked to specific eating behaviors could guide policy formulation. Such insight might generate hypotheses about effective messaging approaches and target groups, taking into account the diversity of dietary habits within a population. Overall, this research emphasizes the need for a nuanced approach in addressing eating behaviors and related public health issues, rather than relying on a one-size-fits-all strategy.

The current study had several limitations. First, this was an exploratory study and therefore we did not have a-priori directional hypotheses. As a conservative approach we utilized a Bonferroni correction when interpreting statistical significance. However, this means that several findings that might meet traditional thresholds for significance were overlooked. These findings, such as different attitudes towards target characters depending on one's own eating behavior (see Table 2) require further replication. Second, the scenario stimuli and targets presented to participants were relatively simple and were hypothetical in nature. Responses to real individuals in real eating situations are undoubtedly more complex. Even so, scenarios contained differences that may influence outcomes in unknown ways (e.g., the social context of a dinner party versus an office setting). It may also be easier to express negative judgments about a fictional individual. However, using vignettes to investigate attitudes toward individuals and groups is common (see [45] for recent example) as it reduces the number of potential confounds that might impact participant attitudes. Moreover, as both vignettes were fictional, relative differences in participants' attitudes are illuminating even if absolute values may be unrepresentative of real life. On a related note, the bitter food scenario was always presented to participants first which may have caused a contrast effect for ratings of the second (reward-based eating) scenario that cannot be disentangled in the current analyses. Third, the data for the current study were drawn from an experiment wherein the presence of an educational module and a difference in perspective were randomly assigned. While we controlled for these variables in all analyses, there may be unknown ways in which this exposure influenced results. This exposure was, however, balanced across groups. Fourth, our experiment design did not include a control condition and as such it is unknown how ratings might compare with non-eating targets. Fifth, our assessment of bitter food liking was created de-novo because a suitable, fully self-report measure could not be identified. Further validation of this scale is needed. Sixth, other measures that may have been useful such as weight stigma and internalized weight

bias were not assessed after each vignette and therefore cannot be compared here. Finally, our sample was drawn from the United States with a majority of respondents reporting White race; the results are likely to be constrained to this cultural context as ideas about eating differ across cultures [46, 47].

In all, this study demonstrates negative attitudes and perhaps stigma associated with specific eating behavior tendencies. Although reporting a corresponding eating tendency in the self can serve to increase empathy towards others who exhibit that behavior, this is not robust for bitter food distaste, and does not lead to a significant reduction in stigma for either eating behavior. These eating behaviors may therefore act like weight stigma for which group membership is not associated with less stigmatizing attitudes [48, 49]. Stigma reduction approaches are needed for all. This interpretation is consistent with theory suggesting that stigmatizing attributes perceived to be ‘self-inflicted’ are more likely to be internalized and negatively judged by affected individuals [50]. Given their conceptual similarities and clear biological and social interrelationships, it is likely that stigmatizing attitudes about certain eating behavior traits could be addressed together weight and obesity stigma reduction efforts. For example, policy and position statements related to weight and obesity have recently challenged the popular notion that weight is a personal choice and have adopted a biological and disease-focused lens. Future work may suggest the need to address eating behavior traits with a similar lens, which could bolster support for efforts to make unhealth and obesogenic foods less ubiquitous and visible [51]. Future work should determine the depth and content of social stereotypes and beliefs about the nature of specific eating behaviors that underlie these patterns. There remains the possibility that educational, perspective-taking, and other interventions could reduce negative attitudes about eating behaviors that tend to engender such responses regardless of whether individuals exhibit that behavior as can be seen in other stigma-related health behavior contexts [52]. Research in related areas suggests that it is crucial to incorporate the perspectives of individuals who, themselves, exhibit stigmatized traits to fully address social implications and root causes [53]. Along these lines, current results suggest the possibility that demonstrating or simulating the experience of having a given eating behavior could improve empathy, particularly if tailored to audiences most likely to be receptive. Although daily life experience of reward-based eating may not naturally reduce stigma, explicit experiential interventions may be effective where natural experience is not. The current work highlights situations under which such intervention may be needed, particularly if negative responses blossom into stigma and its health-threatening sequelae. Future work should elucidate social responses to individual, discrete eating behaviors and determine where such intervention might be most advantageous.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

Attitudes about reward-based eating drive are more negative than bitter food avoidance.

Participants with bitter food avoidance view others with this trait more positively.

Participants with reward-based eating drive view others with this trait similarly to others.

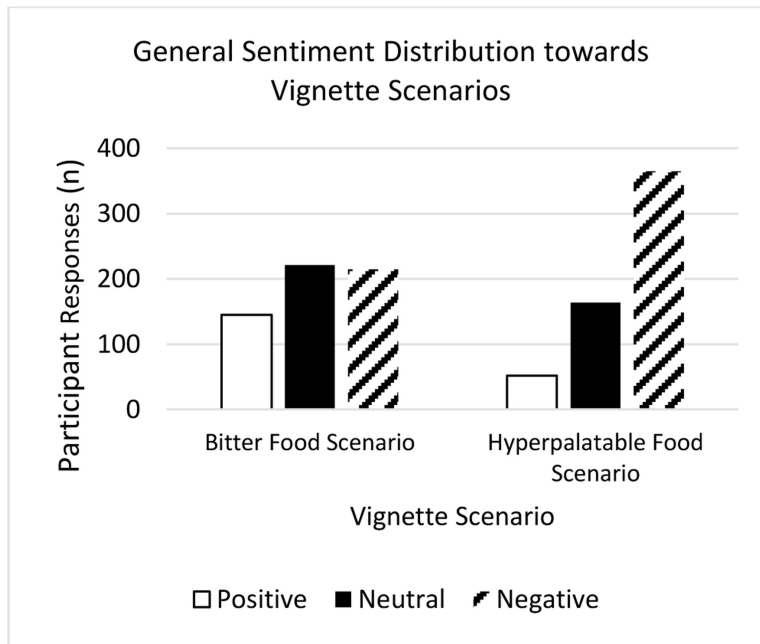


Figure 1: Comparison of Participants' General Sentiment towards the Bitter Food Scenario and the Hyperpalatable Food Scenario

Table 1:

Comparison of Participants' Attitudes towards Hyperpalatable Food Scenario and Bitter Food Scenario

Attitudes	Bitter Food Scenario			Hyperpalatable Food Scenario			Test Statistics		Effect Size
	N (%)			N (%)			McNemar's χ^2 (df)	<i>p</i>	
	<i>Positive</i>	<i>Neutral</i>	<i>Negative</i>	<i>Positive</i>	<i>Neutral</i>	<i>Negative</i>			
General Sentiment Language	145 (25)	221 (38)	215 (37)	52 (9)	164 (28)	365 (63)	98.67 (3)	<.001	0.15
	<i>Absent</i>	<i>Present</i>	-	<i>Absent</i>	<i>Present</i>	-			
Health Judgement Language	442 (76)	139 (24)		533 (92)	48 (8)		49.091(1)	<.001	0.01
Stigmatizing Language	549 (94)	32 (6)		516 (89)	65 (11)		12.05 (1)	<.001	0.06
Normative Language	504 (87)	77 (13)		510 (88)	71 (12)		0.26 (1)	0.61	0.24
	Mean (SD)			Mean (SD)			<i>t</i> (df)	<i>p</i>	
Self-Other Overlap	3.24 (1.85)			3.21 (1.86)			0.32 (1161)	0.75	0.02
Empathy	2.49 (1.06)			2.46 (1.15)			0.43 (1154.2)	0.67	0.03

Table 2:

Regression Models Predicting Participants' Attitudes and Cognitions Towards Target Depending upon on Personal Eating Characteristics

Attitude and Cognition Outcomes	Participant's Reward Based Eating Drive Trait			Participant's Bitter Food Dislike Trait		
Bitter Food Scenario	β	t	p	β	t	p
General Sentiment Language	-0.02	-0.53	.60	-0.12	-2.21	.03
Health-Judgement Language	-0.03	-1.50	.14	-0.00	-0.11	.91
Stigmatizing Language	0.00	0.35	.73	-0.04	-2.33	.02
Normative Language	-0.01	-0.88	.38	0.06	2.57	.01
Self-Other Overlap	0.21	2.90	.004	0.91	7.58	<.001
Empathy	0.11	2.63	.009	0.12	1.73	.08
Hyperpalatable Food Scenario	β	t	p	β	t	p
General Sentiment Language	-0.05	-1.81	.07	-0.02	-0.48	.63
Health-Judgement Language	0.01	0.45	.65	-0.03	-1.69	.09
Stigmatizing Language	-0.01	-1.11	.27	0.00	0.12	.90
Normative Language	0.02	1.60	.10	0.02	0.95	.35
Self-Other Overlap	0.67	9.44	<.001	0.04	0.30	.77
Empathy	0.23	5.17	<.001	-0.06	-0.87	.38

Note: All regression models include vignette perspective, educational condition, and dispositional empathy as covariates. A Bonferroni correction approach was used to account for the multiple comparisons in each regression model.