

Evidence of a self-serving bias in people's attributions for their food intake

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ABSTRACT

People often fail to acknowledge external influences on their food intake, but there might be some circumstances in which people are willing to report that those external factors influenced their behavior. This study examined whether participants who believed that they had overeaten would indicate that the portion size they were served influenced their food intake. Participants (119 women) ate a pasta lunch at two separate sessions, one week apart. At the second session, participants were randomly assigned to receive either a regular portion of pasta (the same portion as the first session) or a large portion of pasta (a portion that was twice the size), and to receive false feedback about their food intake indicating that they had either eaten about the same as or substantially more than they had at the previous session. Participants were then asked to indicate the extent to which the amount of food served influenced how much they ate at that second session. Compared to participants who were informed that they had eaten the same amount across the two sessions, those who were informed that they ate more at the second session reported a stronger influence of the amount of food served if they also received a large portion of pasta, but not if they received a regular portion of pasta. These findings suggest that the willingness to implicate external influences (e.g., portion size) on one's food intake may be driven by a self-serving bias, providing an "excuse" for overeating. However, the external cue must be salient enough to be a plausible explanation for one's behavior.

1. Introduction

External eating cues, such as portion size and the behavior of one's eating companions, have been shown to be potent drivers of food intake (e.g., Ruddock, Brunstrom, Vartanian, & Higgs, 2019; Vartanian, Spanos, Herman, & Polivy, 2015; Zlatevska, Dubelaar, & Holden, 2014). Despite the clear evidence that such external factors influence food intake, lay people often fail to acknowledge their impact (e.g., Cavanagh, Vartanian, Herman, & Polivy, 2014; Vartanian, Herman, & Wansink, 2008). Instead, people overemphasize the impact of internal factors such as how hungry they are, and underemphasize the impact of external factors (Vartanian et al., 2008; Vartanian, Sokol, Herman, & Polivy, 2013). For example, in one study, pairs of women watched a film clip while snacking on pizza bites. There was a much stronger correlation between the amount of pizza eaten by the pairs of participants ($r = 0.64$) than between participants' hunger level and how much they ate ($r = 0.19$). However, when participants were asked to indicate *why* they ate as much as they did, 52% of participants cited their hunger level, whereas only 2.5% mentioned anything at all to do with the presence or

behavior of their co-eater (Vartanian et al., 2008).

Some studies do suggest that a minority of participants will report that social factors influenced their eating behavior, at least when they are asked directly (e.g., (Robinson and Field, 2015)), but there is reason to doubt the validity of these participants' reports. For example, one study found that 21% of participants reported eating *less* because their eating companion ate less, but this was true regardless of whether participants were exposed to a low-intake companion or a high-intake companion (Hermans, Larsen, Herman, & Engels, 2012; see also Christie & Chen, 2018). These findings suggest that people may fail to accurately report external influences on their food intake in part because, even if they are aware of the external factors, they are unaware of how these factors influenced their food intake.

There might be some circumstances in which people may be particularly willing to report that external factors influenced their food intake, especially if doing so allows them to "explain away" undesirable behavior. Research on attributions in other domains has suggested that the attributions people make are self-serving and are aimed at enhancing or protecting their self-esteem (e.g., Campbell & Sedikides, 1999;

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Weiner, 1985). Specifically, people tend to make internal attributions for successes or positive outcomes (e.g., I did well on this test because I'm smart and I worked hard) but make external attributions for failures or negative outcomes (e.g., I did not do well on this test because the teacher is an overly harsh marker) (e.g., Greenberg, Pyszczynski, & Solomon, 1982).

In the context of eating, people may turn to external explanations for their behavior when they believe that they have overeaten. There is some preliminary support for this suggestion. In one study (Vartanian, Reily, Spanos, Herman, & Polivy, 2017), participants received a small portion or a large portion of pasta to consume for lunch and, after they finished eating, they were asked to indicate whether they had eaten more, less, or about the same as they would normally eat for lunch. Participants who reported that they had eaten more than they would normally eat for lunch indicated a stronger influence of the portion size on their food intake than did those who reported that they had eaten the same amount or less than they normally would. Furthermore, attributions to the external cue (portion size) were greatest when participants were served a large portion, which suggests that the external cue must be salient enough to be a plausible explanation for one's behavior.

1.1. The present study

Attributions for food intake might be self-serving, but the preliminary evidence for this proposition is based on a study in which participants self-reported their belief that they had eaten more than they normally would in a similar situation (Vartanian, Reily, et al., 2017), and it is likely that this belief was at least in part related to the actual amount of food that they consumed in that study. The aim of the present study was to provide evidence for a self-serving bias in people's attributions for their food intake by providing participants with feedback about how much they have eaten that was independent of the actual amount consumed. Participants came to the laboratory for lunch on two separate occasions, one week apart. At the first session, they were given a portion of pasta for lunch. At the second session, they were given either the same size portion of pasta or a portion of pasta that was twice as large. After completing their meal at this second session, participants were given (fictitious) feedback about how much they ate relative to how much they had eaten at the first session. Half of the participants were informed that they had eaten about the same amount as they did during the previous session, whereas the other half were informed that they had eaten substantially more than they had at the previous session. Participants were then asked to indicate why they ate as much as they did at the second session. We predicted that participants given the "ate more" feedback (compared to "ate the same" feedback) would report a stronger influence of the portion size on how much they ate, particularly if they were given the large portion at the second session.

2. Method

2.1. Participants

Participants were women recruited from the 1st-year undergraduate psychology pool at UNSW Sydney or from the community via the university's online research sign-up system. Only individuals who identified as women were invited to participate so that we could draw comparisons to previous research in the area (e.g., Vartanian, Reily, et al., 2017). Undergraduate participants received course credit for participation and community participants received monetary reimbursement.

The sample size was determined a priori based on the findings of Vartanian, Reily, et al. (2017). In that study, there was a large difference in attribution to portion size between participants who reported that they "ate more" than they would normally eat and those who reported that they "ate the same" as they normally would (Cohen's $d = 0.94$), and the magnitude of this difference was substantially greater for participants in the large-portion condition (Cohen's $d = 1.73$) than in the

small-portion condition (Cohen's $d = 0.40$). The effect size for the interaction reported in that original paper was moderate ($\eta_p^2 = 0.06$), but also included the group of participants who reported that they "ate less" than they normally would, which is not relevant to the current study. Re-analyzing the data after removing the "ate less" group resulted in an even larger interaction effect ($\eta_p^2 = 0.09$). Thus, we anticipated at least a medium effect size in the current study. Using G*Power (2×2 between-subjects design with power set at 80% and alpha set at 0.05), we estimated that we would require a sample of 128 participants to detect a medium effect ($f = 0.25$). We also anticipated some potential exclusions and thus over-recruited, for an initial sample of 189 participants. Participants were excluded if they did not attend both study sessions ($n = 29$), if they misperceived the feedback ($n = 35$),¹ or if they failed the attention checks ($n = 5$), which resulted in a final sample of 119 participants (63% of the originally recruited sample). Although this final sample is slight smaller than the original target of 128, it still provides us with sufficient power to detect a medium effect ($f = 0.26$) at 80% power.

Participants' mean age was 21.4 years ($SD = 3.5$) and their mean body mass index (BMI; kg/m^2) was 22.1 ($SD = 2.6$). Regarding ethnicity, 54.6% of participants identified as Asian, 34.5% identified as White, and 11.0% identified with other ethnicities. Of the sample, 42.0% had lived in Australia for more than 10 years, 10.1% had lived in Australia for between 3 and 10 years, and 47.9% had lived in Australia for less than 2 years. The study was approved by UNSW Sydney's Human Research Ethics Committee (HREC 14060).

2.2. Manipulations

Portion-size manipulation. At Session 1, participants were all served a 400 g portion of pasta with tomato sauce (290 g of pasta and 110 g of sauce). At Session 2, participants received either a 400 g portion of pasta with tomato sauce (which was identical to the portion they had received at Session 1; we refer to this as the "regular" portion) or an 800 g portion (580 g of pasta and 220 g of sauce; we refer to this as the "large" portion). The regular and large portions were served in the same sized bowl. The bowls with pasta and sauce were weighed to the nearest gram before and after the meal to determine the total amount that participants ate, and the amount of food eaten at Session 2 provided the basis for the feedback manipulation (described below).

Feedback manipulation. In Session 2, after participants finished eating, they received false feedback about the amount of food they had consumed in Session 2 compared to Session 1. Half the participants were informed that "today you ate about the same amount as you ate last week (less than 2% difference in food intake)" ("Ate the Same" feedback); the other half of the participants were informed that "today you ate 35% more than you ate last week" ("Ate More" feedback). The feedback was presented in written form on a tablet. In order to make the feedback seem more plausible, participants were given accurate information about the amount that they had consumed at Session 2, and this value was used to calculate a false value for their Session 1 intake that was in line with their assigned condition. For the Ate-More feedback condition, Session 2 intake was divided by 1.35 to generate a false Session 1 intake value that led participants to believe that they had consumed 35% more at Session 2 than at Session 1. For example, a participant who had consumed 366 g in Session 2 would have been informed that they had consumed 271 g in Session 1 (regardless of their true Session 1 intake). For the Ate-the-Same feedback condition, Session 2 intake was either divided by 1.01 or multiplied by 1.01 to generate a

¹ The number of participants who misperceived the feedback was quite similar across conditions (Regular/Ate the Same = 9; Regular/Ate More = 2; Large/Ate the Same = 11; Large/Ate More = 13), except that participants in the Regular/Ate-More condition were least likely to misperceive the feedback, $\chi^2 = 3.99$, $p = 0.046$.

false Session 1 intake value that led participants to believe that they had consumed either 1% less or 1% more at Session 2 than at Session 1. See Fig. 1 for sample feedback.

2.3. Measures

2.3.1. Attributions

Participants' attributions for eating as much as they did were measured in two ways. First, consistent with previous research (e.g., Vartanian et al., 2008; Vartanian, Reily, et al., 2017), participants were asked to consider to what extent a range of plausible factors influenced them to eat more than (or the same amount as) the previous week. This measure is referred to as "influence ratings". Participants responded to each of 19 items on a 7-point scale ranging from 0 = *did not influence me* to 6 = *influenced me a great deal*. The two factors of interest were "the amount of food I was served" because portion size was the manipulated external cue, and "how hungry I was" because this is primary reason that people generally cite to explain their food intake (e.g., Vartanian et al., 2008). The remaining items were filler items (e.g., "the taste of the food"; "how difficult it was to make taste ratings"; "the amount of time since I last exercised"; "my emotional state"; "a pre-existing medical condition") that served to mask our interest in these two main factors.²

Because most research on attributions for food intake has involved asking participants to rate the degree to which their intake had been influenced by various factors, we included a second approach to asking about attributions in order to determine whether similar results would emerge. This second approach was adapted from Fitch (1970) and asked participants what percentage of their eating behavior they would attribute to each of four factors: the amount of food that they were served, how hungry they were, the taste of the food, and what was expected of them. The specific instructions were: "We would like to you consider why you ate as much as you did today in terms of the factors listed below. What percentage of your eating behaviour would you attribute to each factor?" Participants entered a percentage value from 0% to 100% for each of the four factors such that the total summed to 100%. Again, only responses to the amount of food served and hunger were of interest for the present study. This measure is referred to as "proportion of influence".

2.3.2. Integrity checks

We used several strategies to ensure the integrity of the data in the current study. First, we included a manipulation check to verify that participants had understood and recalled the feedback with which they were provided. Participants were asked "What feedback were you given about your food intake after you finished eating today?" Response options were: "I was not given feedback"; "That I ate less food today than I ate last week"; "That I ate about the same amount of food today as I ate last week"; and "That I ate more food today than I ate last week." Participants were excluded from the study if they selected the "no feedback" or "Ate-Less feedback" option, or if they selected an option that did not match their assigned condition (i.e., participants in the Ate-More condition indicating that they were given Ate-the-Same feedback, or participants in the Ate-the-Same condition indicating that they were given Ate-More feedback). We also included a series of attention-check questions throughout the study, which involved directing participants to

select a particular response option on a measure (e.g., Choose "Somewhat true" for this item). Participants were excluded from the study if they answered 2 or more (out of 7) attention-check questions incorrectly. Finally, at the end of the study, participants completed a funnel-debriefing on the tablet that asked them what they thought the purpose and hypotheses of the study were. No participants guessed the purpose or hypotheses of the study.

2.4. Procedure

Participants signed up for a two-part study ostensibly about taste perception, with Session 2 scheduled to occur exactly one week after Session 1, on the same day of the week and at the same time of day. Sessions were scheduled to begin between 11am and 2:45pm, and participants were asked to refrain from eating for 3 h prior to each session. Prior to the commencement of the study, a random number generator was used to randomly assign participants to one of the four conditions: regular portion/Ate-the-Same feedback ($n = 30$); regular portion/Ate-More feedback ($n = 32$); large portion/Ate-the-Same feedback ($n = 28$); or large portion/Ate-More feedback ($n = 29$). At each session, participants attended the laboratory alone, and the entire study took place in a room that has been set up to resemble a home dining room. All participants provided informed consent.

At Session 1, participants were told that they were having pasta for lunch. They first reported their baseline hunger (0 = *Not at all hungry*; 100 = *Extremely hungry*), and were then provided with their pasta lunch. To bolster the cover story that this was a study about taste perception, participants were asked to complete one taste-rating form (e.g., how salty, how good-tasting) based on the first mouthful of food that they tasted, and a second, identical taste-rating form based on the last mouthful that they tasted. Participants were left alone for 12 min to have their lunch and complete their taste ratings.

At Session 2, participants first reported their baseline hunger (0 = *Not at all hungry*; 100 = *Extremely hungry*) and then received either the regular or larger portion of pasta for lunch. They were left alone to have lunch and make their taste ratings for 12 min, as in Session 1. After 12 min, the experimenter returned to the room and provided participants with a tablet on which they received their intake feedback and also completed the remaining questionnaires (the feedback manipulation and all questionnaires were delivered through Qualtrics). First, participants were asked to think about why they ate more than (or about the same as) they had the week before and completed the two attributions questionnaires. Participants then completed some demographic questions, attention checks, and were probed for suspicion and debriefed.

2.5. Statistical analysis

All analyses were conducted in SPSS. First, 2 (feedback: Ate More vs. Ate the Same) $\times$ 2 (portion size: regular vs. large) ANOVAs were conducted to confirm that there were no differences in Session 2 food intake, intake differential (Session 2 intake minus Session 1 intake), and baseline hunger across conditions. Next, a series of 2 (feedback: Ate More vs. Ate the Same) $\times$ 2 (portion size: regular vs. large) ANOVAs were conducted to examine the impact of the independent variables on participants' attributions for their food intake, with Bonferroni-corrected simple effects used to probe significant interactions. These analyses were conducted separately for the two formats of the dependent variables (i.e., influence ratings and proportion of influence), and for attributions about amount of food served and for attributions about hunger. Follow-up paired-sample *t*-tests were conducted to compare attributions to hunger vs. amount served, separately for each of the conditions. The influence ratings were treated as continuous variables for the purpose of these analyses.

² Taste is another factor that people commonly acknowledge as an influence on their food intake. However, taste is neither purely external nor purely internal because it is dependent both on the properties of the food itself (an external component) and the individual's taste preferences (an internal component). Furthermore, taste as an explanation for one's food intake seems to be more relevant for snack foods (e.g., cookies or M&Ms) than for meal foods (e.g., pasta or pizza) (Vartanian et al., 2008, 2013). For these reasons, we did not consider taste to be relevant in the current context and taste was not included in the analyses.

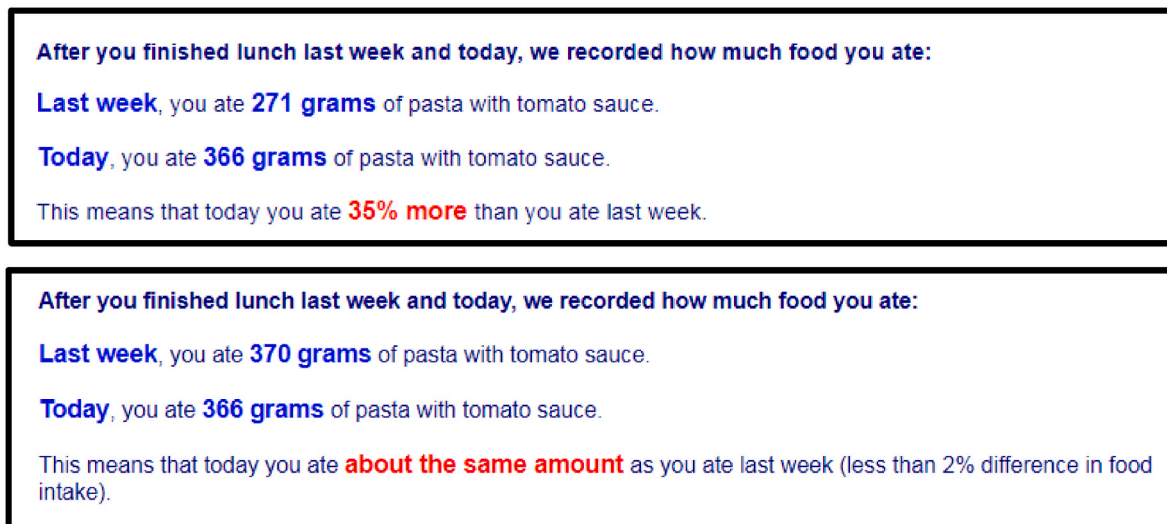


Fig. 1. Sample feedback given to participants at Session 2

Note: This figure presents Ate-More feedback (top panel) and Ate-the-Same feedback (bottom panel) for a hypothetical participant who ate 366 g of pasta at Session 2.

3. Results

3.1. Preliminary analyses

Food intake at Session 2 did not differ by condition: There was no main effect of portion size, $F(1,115) = 0.98$, $p = 0.325$, $\eta_p^2 = 0.01$, no main effect of feedback condition, $F(1,115) = 0.12$, $p = 0.735$, $\eta_p^2 = 0.001$, and no portion-size $\times$ feedback interaction, $F(1,115) = 0.06$, $p = 0.806$, $\eta_p^2 = 0.001$ (see Table 1). The food-intake differential (Session 2 – Session 1 intake) also did not vary by condition: There was no main effect of portion size, $F(1,115) = 2.72$, $p = 0.102$, $\eta_p^2 = 0.02$, no main effect of feedback condition, $F(1,115) = 1.10$, $p = 0.297$, $\eta_p^2 = 0.01$, and no portion-size $\times$ feedback interaction, $F(1,115) = 0.13$, $p = 0.722$, $\eta_p^2 = 0.001$. Similarly, baseline hunger did not differ by condition: There was no main effect of portion size, $F(1,115) = 0.92$, $p = 0.340$, $\eta_p^2 = 0.01$, no main effect of feedback condition, $F(1,115) = 0.002$, $p = 0.963$, $\eta_p^2 < 0.001$, and no portion-size $\times$ feedback interaction, $F(1,115) = 2.62$, $p = 0.108$, $\eta_p^2 = 0.02$. These results confirm that the feedback participants received following their Session 2 intake was independent of the amount of food they consumed and their baseline hunger.

Table 1

Means (SD) for Session 2 intake, intake differential (Session 2 – Session 1 intake), and Session 2 baseline hunger by condition.

	Session 2 intake in grams	
	Regular portion	Large portion
Ate-the-Same feedback	275.2 (93.3)	290.3 (149.6)
Ate-More feedback	277.1 (82.5)	302.21 (110.9)
	Intake differential in grams (Session 2 – Session 1 intake)	
	Regular portion	Large portion
Ate-the-Same feedback	13.5 (77.5)	34.0 (104.7)
Ate-More feedback	24.5 (61.0)	56.2 (98.0)
	Session 2 baseline hunger (0–100)	
	Regular portion	Large portion
Ate-the-Same feedback	65.0 (20.0)	67.7 (23.7)
Ate-More feedback	71.4 (22.2)	61.0 (23.1)

3.2. Influence of amount of food served

The 2×2 ANOVA on ratings of the influence of amount of food served showed only a significant portion-size-by-feedback interaction, $F(1,115) = 16.15$, $p < 0.001$, $\eta_p^2 = 0.12$ (see Fig. 2, left pane). Planned contrasts indicated that participants in the large-portion condition who were given Ate-More feedback rated the amount of food served as more influential than did those who received Ate-the-Same feedback, $p = 0.001$, $\eta_p^2 = 0.09$. Unexpectedly, for participants in the regular-portion condition, those given Ate-the-Same feedback rated the amount of food served as more influential than did those who received Ate-More feedback, $p = 0.019$, $\eta_p^2 = 0.05$. The main effect of portion size ($F = 0.05$, $p = 0.832$, $\eta_p^2 < 0.001$) and the main effect of feedback ($F = 0.54$, $p = 0.464$, $\eta_p^2 = 0.005$) were not significant.

For the proportion of influence attributed to the amount of food served, there was no main effect of portion size, $F(1,115) = 3.32$, $p = 0.071$, $\eta_p^2 = 0.03$, but there was a main effect of feedback, $F(1,115) = 7.94$, $p = 0.006$, $\eta_p^2 = 0.07$, and a portion-size-by-feedback interaction, $F(1,115) = 9.29$, $p = 0.003$, $\eta_p^2 = 0.08$ (see Fig. 2, right pane). Planned contrasts indicated that participants in the large-portion condition who were given Ate-More feedback attributed a greater proportion of their food intake to the amount of food served than did those who received Ate-the-Same feedback, $p < 0.001$, $\eta_p^2 = 0.13$. For participants in the regular-portion condition, there was no difference between those who were given Ate-More feedback and those who were given Ate-the-Same feedback, $p = 0.868$, $\eta_p^2 < 0.001$.

3.3. Influence of hunger

The 2×2 ANOVA on ratings of the influence of hunger as an explanation for the amount of food eaten found no significant main effects or interactions ($F_s < 2.93$, $p_s > 0.08$, $\eta_p^2 < 0.03$). Participants consistently provided high ratings for the influence of hunger, regardless of feedback condition and portion-size condition (see Fig. 3, left pane).

For proportion of influence attributed to hunger, there were no main effects ($F_s < 2.51$, $p_s > 0.11$, $\eta_p^2 < 0.25$), but there was again a significant interaction between portion-size and feedback condition, $F(1,115) = 4.00$, $p = 0.048$, $\eta_p^2 = 0.03$ (see Fig. 3, right pane). Although there was a significant interaction, neither of the simple effects was statistically significant: For participants in the large-portion condition, there was no difference between those who were given Ate-More feedback and those who were given Ate-the-Same feedback, $p = 0.310$, $\eta_p^2 = 0.01$. For participants in the regular-portion condition, there was a small tendency for

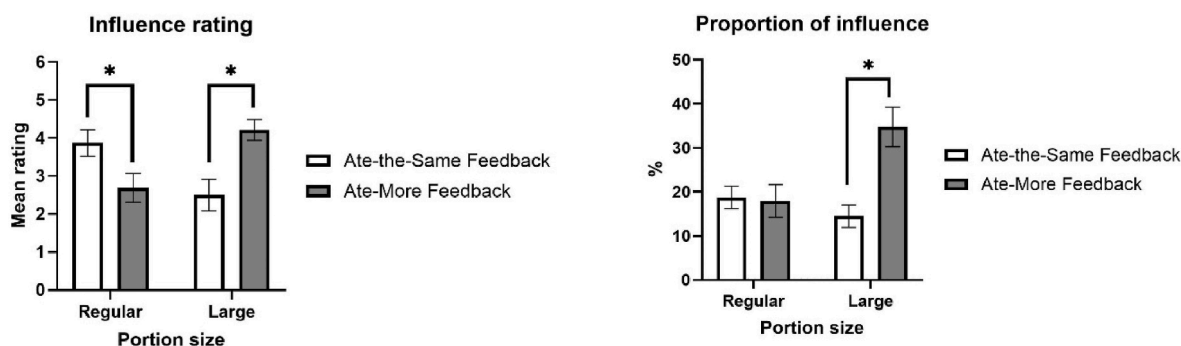


Fig. 2. Attributions to “amount of food served” by feedback and portion-size condition

Note. Influence ratings are in the left pane; proportion of influence is in the right pane. Error bars represent standard errors. Significant contrasts marked by an asterisk.

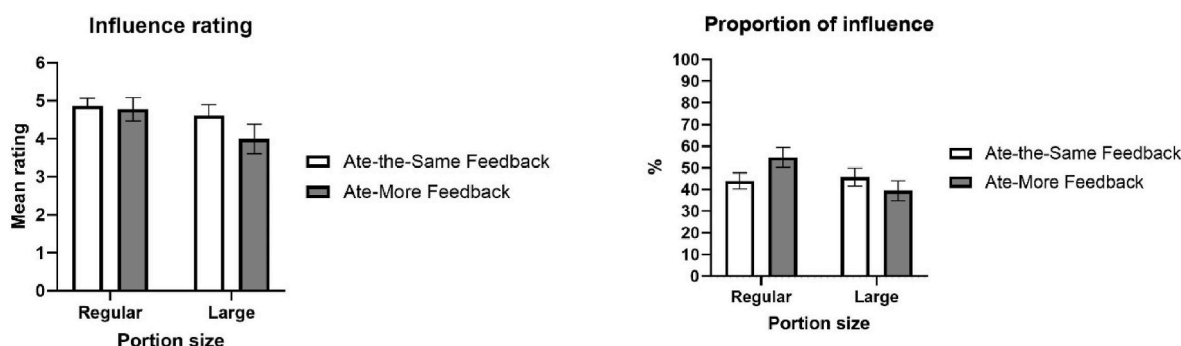


Fig. 3. Attributions to “hunger” by feedback and portion-size condition

Note. Influence ratings are in the left pane; proportion of influence is in the right pane. Error bars represent standard errors.

those given Ate-More feedback to attribute a greater proportion of their food intake to hunger than did those given Ate-the-Same feedback, but this difference was not significant, $p = 0.070$, $\eta_p^2 = 0.03$.

3.4. Hunger-amount comparison

Supplementary follow-up analyses showed that hunger was rated as a stronger influence on food intake than was the amount of food served in all conditions, *except* for the large-portion/Ate-More-feedback condition (see Table 2, left columns).

Similarly, for the proportion of influence analysis, supplementary follow-up analyses indicated that participants attributed a greater proportion of their food intake to hunger than to the amount of food served in all conditions, *except* for the large-portion/Ate-More-feedback condition (see Table 2, right columns).

4. Discussion

Previous research suggests that people may be willing to make external, self-exonerating attributions for their food intake when they believe that they have overeaten. The primary aim of the present study was to provide evidence for this observation by giving people false

feedback about how much they ate. As predicted, participants given “ate more” feedback were more likely to indicate that the amount of food served caused them to eat more than they had at a previous meal, but only when they were also given a large portion of food. This finding is consistent with previous research showing that participants who reported that they ate more than they typically would were more likely to use external attributions, especially when they were given a large portion (Vartanian, Reily, et al., 2017). Note that in the Vartanian, Reily, et al. (2017) study, participants who reported that they ate more than they typically would have actually did eat more compared to those who reported that they ate about the same as they typically would have (although controlling for the actual amount eaten did not change the results). In the present study, because participants were randomly assigned to condition, there was no difference in intake for people who received Ate-More vs. Ate-the-Same feedback. The fact that the feedback provided in the present study was independent of the amount of food that participants actually ate indicates that the attributions are driven by people’s beliefs about their food intake rather than by any actual influence of the external cue.

Unexpectedly, participants in the regular-portion condition who were given Ate-the-Same feedback rated the amount of food served as a stronger influence on their food intake than did those given Ate-More

Table 2

Mean difference between attributions to hunger and amount of food served (Hunger-Amount).

Condition	Influence ratings				Proportion of influence			
	M_{diff}	t	p	Cohen’s d	M_{diff}	t	p	Cohen’s d
Regular/Ate the Same	1.00	2.61	0.014	0.48	25.27	4.73	<0.001	0.86
Regular/Ate More	2.09	3.94	<0.001	0.70	36.91	4.96	<0.001	0.88
Large/Ate the Same	2.11	4.07	<0.001	0.77	31.29	5.39	<0.001	1.02
Large/Ate More	−0.21	0.44	0.663	−0.08	4.72	0.57	0.576	0.11

feedback, suggesting that they may have been using an external cue to explain why they *did not* overeat. However, this effect did not emerge in the proportion-of-influence analysis, and was also not observed in the previous study examining attributions based on participants' self-reports of having eaten the same as (or less than) they typically would (Vartanian, Reily, et al., 2017), and thus might not be a replicable finding.

Attributions to hunger were consistently high, and did not differ by condition. The prominence of hunger as an explanation for one's food intake is consistent with previous research suggesting that hunger is always available as an explanation for how much one eats, and does not depend on the conditions surrounding one's food intake (e.g., Vartanian, Reily, et al., 2017; Vartanian, Spanos, Herman, & Polivy, 2017). Furthermore, hunger was rated as a stronger influence than the amount of food served in all conditions, *except* when participants were told that they had eaten more than they had eaten previously and they had been served the large portion, in which case hunger and the amount of food served were given equal weighting. This finding again parallels the results of a previous study that was based on participants' reports of how much they ate: In that study, hunger was rated as a more of an influence than was the amount of food served in all conditions except when participants were given a large portion and felt that they had overeaten (Vartanian, Reily, et al., 2017). The fact that the large portion size seems to be necessary for participants to invoke the external attribution supports the notion that the salience of the external cue can play a role in whether or not that cue is used to explain one's food intake.

By manipulating the feedback that participants were given about their food intake, we were able to provide causal evidence that believing that one has eaten more than on a previous occasion (independent of how much one has actually eaten) affects the attributions that one makes for one's food intake. At the same time, however, we acknowledge that the context of the meal (eating alone as part of a psychology experiment) and the way in which the feedback was communicated to participants (text presented on a tablet) lacked external validity. It would be worthwhile to examine how people make attributions about their food intake in their natural environment to determine whether they spontaneously make external attributions when they believe that they have overeaten. It would also be worth examining the consequences of these attributions. For example, because guilt is typically connected to feelings of personal responsibility (Weiner, 1985), people may feel less guilty after overeating if they attribute that overeating to external causes. It may also be that the attributions that they make have behavioral consequences, such as whether or not they intend to compensate for their overeating at subsequent meals. If people try to avoid taking responsibility for their overeating, then the converse might be true for restriction: People may be more likely to make internal attributions for occasions when they successfully control their food intake. This proposition could be explored in future research. A limitation of the current study is that (as with other research in this area) we considered attributions made only by women. There is some evidence that men may respond differently than women to external cues such as portion size (Zlatevska et al., 2014) and social influences (Bellisle, Dalix, & de Castro, 1999; Vartanian et al., 2015). It may be that men and women also make different attributions for their food intake, with different consequent affective and behavioral responses. Exploring this possibility would be an interesting path for future research.

In conclusion, there appear to be some circumstances in which people are willing to report that external factors influenced their food intake, but the accuracy of these reports is questionable. Instead, it seems that the willingness to implicate external influences on one's food intake may be driven by a self-serving bias, much as attributions for other behaviors and outcomes are. In particular, people seem to be willing to report external influences on their food intake when they believe that they have overeaten, providing them with an "excuse" that does not hinge on personal responsibility. Future research should explore the potential consequences of making these inaccurate-but-self-

serving attributions related to one's food intake.

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Ethical statement

The study protocol was approved by UNSW Sydney's Human Research Ethics Committee and was conducted in line with ethical standards stated in the Declaration of Helsinki 1975. All participants provided written informed consent.

CRediT authorship contribution statement

Lenny R. Vartanian: Writing – review & editing, Writing – original draft, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Natalie M. Reily:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Samantha Spanos:** Writing – review & editing, Methodology, Investigation, Conceptualization. **C. Peter Herman:** Writing – review & editing, Methodology, Conceptualization. **Janet Polivy:** Writing – review & editing, Methodology, Conceptualization.

Declaration of competing interest

The authors have no conflicts of interest to declare.

Data availability

Data will be made available on request.

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