

# Judgments of Body Weight Based on Food Intake: A Pervasive Cognitive Bias Among Restrained Eaters

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## ABSTRACT

**Objective:** Two studies examined the influence of meal-size information on restrained and unrestrained eaters' judgments of body weight and size.

**Method:** In Study 1, restrained and unrestrained eaters made body-weight and body-size judgments of a woman who had eaten either a small meal or a large meal. In Study 2, participants watched a video of a woman eating a small or large meal, and selected from two photographs of women's bodies (a heavier one and a thinner one), the woman whom they had seen in the video.

**Results:** Restrained eaters were influenced by meal-size information, judging women who had eaten a smaller meal as

being thinner and weighing less (Study 1), and also choosing the thinner body to represent the woman who had eaten a smaller meal (Study 2). Unrestrained eaters were not influenced by food-intake information.

**Conclusion:** Restrained eaters' (but not unrestrained eaters') judgments of others appear to be biased by meal-size information, suggesting that restrained eaters' food- and weight-related cognitive biases might be more pervasive than has previously been assumed. © 2007 by Wiley Periodicals, Inc.

**Keywords:** restrained eaters; cognitive biases; body-weight judgements

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## Introduction

Cognitive biases or distortions, particularly about body weight and shape, have been well documented among weight-preoccupied individuals. These distortions include biases in attention to, memory for, and interpretation of food- and weight-related stimuli. For example, several studies have shown that dieters selectively attend to food and weight information in a modified Stroop task.<sup>1–4</sup> Other research has shown that restrained eaters recall more food-, eating-, and weight-related information<sup>5</sup> and that weight-preoccupied individuals interpret ambiguous sentences with a fatness interpretation, whereas control participants

use a thinness interpretation.<sup>6</sup> It has been suggested that these cognitive biases might contribute to the development and maintenance of eating-disorder pathology, in part by promoting preoccupation with food and weight.<sup>7–9</sup>

A basic assumption of cognitive models of eating pathology is that the biases and beliefs common among weight-preoccupied individuals are especially relevant to the self,<sup>8</sup> as is the case, for example, with cognitive biases in anxiety disorders.<sup>10</sup> Indeed, one of the strategies used in cognitive therapy to challenge irrational thoughts is to ask patients to consider whether the rules and biases that they apply to themselves are the same as those that they apply to other people.<sup>11</sup> There is very little research, however, testing the egocentric nature of these biases among weight-preoccupied individuals beyond the King et al.<sup>5</sup> study. To determine the pervasiveness or generality of such biases, it is useful to ascertain whether such biases are applied only to judgments of the self, or whether they are also applied to judgments of others. If some of the cognitive biases of weight-preoccupied individuals are not as egocentric as was previously assumed, this could have important implications for our understanding of these biases, as well as for treatment efforts aimed at modifying those biases. For example, it would be of little clinical utility to ask a

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patient to try to challenge her or his beliefs and thoughts by considering another person in a similar situation if the patient believes that similar rules do in fact apply to that other person.

The few extant studies examining the generality of eating- and weight-related cognitive biases indicate that they might indeed be more globally applied than was previously assumed. For example, some researchers<sup>12,13</sup> have found positive correlations between errors in the estimates of one's body size and errors in the estimates of the size of various nonself objects (e.g., the experimenter's waist, a mannequin, and a cereal box). Others<sup>14</sup> have shown that women with high levels of bulimic symptoms were more likely to use body-size information (and less likely to use affect information) in categorizing photographs of other women. And another study<sup>15</sup> found that restrained eaters, but not unrestrained eaters, made weight-related attributions for the successes and failures of another woman.

A specific cognitive distortion that is commonly observed in clinical practice with eating-disorder patients, but that has received relatively little attention in the research literature, is that these individuals report feeling "fat" after having consumed a large meal or a forbidden food. There is some preliminary empirical support for this observation. In one study, McKenzie et al.<sup>16</sup> found that bulimic patients judged their body size to have increased after having consumed a candy bar and a soda, whereas control participants did not. Thompson et al.<sup>17</sup> also found some evidence that consuming a milkshake that was perceived to be high in calories resulted in greater overestimation of body size among normal-weight female college students. Recent research has also examined a closely related phenomenon: Thought-Shape Fusion (TSF). TSF involves the belief that one has gained weight after simply *imagining* that one has consumed a forbidden food.<sup>18</sup> TSF has been found to be highly correlated with measures of eating disturbance: Individuals high in eating-disorder pathology demonstrate an increased likelihood of perceiving themselves as having gained weight after thinking about consuming a forbidden food. Such cognitive biases might help to explain why dieters and eating-disorder patients are so fearful of the effects of a single meal on their weight, and why they try to adhere to such rigid guidelines for their food intake.

Again, we can ask whether such biases or distortions are applied to judgments of others, or whether they are limited to judgments of the self. Biases in judgments that are applied to others as well as to the self would presumably be more pervasive (and more difficult to challenge) than are beliefs that are

applied only to the self. In the present studies, we were interested in whether the cognitive distortion related to food-intake and body-weight judgments would extend to perceptions of other people.

There is considerable evidence that people attribute a wide variety of traits (e.g., gender roles, social appeal, morality) to other people based on their food intake ("consumption stereotypes"; for a review, see Vartanian et al.<sup>19</sup>). People also make judgments of other people's body weight and size based on their food intake. For example, target individuals (both women and men) verbally described as eating smaller meals were judged to be thinner than were individuals described as eating larger meals.<sup>20,21</sup> This previous research, however, did not specifically examine these types of judgments among weight-preoccupied individuals. We might expect that individuals with high levels of dietary restraint or eating pathology would be particularly aware of food intake and weight cues, and would therefore be particularly likely to judge others in terms of how much they eat.

The present research examined the influence of meal-size information on restrained and unrestrained eaters' judgments of targets' body weight and size, which we hoped would help us to understand more fully the biases in restrained eaters' use of food and weight information. Given previous research on attention and memory biases among restrained eaters, we predicted that restrained eaters would use meal-size information in forming judgments of a target individual's body weight and size, which would provide evidence that this bias extends beyond judgments of the self. In contrast, we expected that unrestrained eaters would be relatively unaffected by meal-size information in forming judgments of the target's body weight and size.

## Study 1

### Method

**Participants.** Eighty-three undergraduate students (41 women; 42 men) were recruited from an introductory psychology course at the University of Toronto. Their mean age was 20 years (range = 17–46). All participants received course credit for participation.

The data from five male participants were excluded due to technical problems, and the data from one female participant were excluded because she failed to follow the experimental protocol. Thus, the final sample consisted of 77 participants (40 women; 37 men).

**Materials.** Participants were presented with either a video clip or a written description of a woman eating ei-

ther a small meal or a large meal. Each meal consisted of a turkey and cheese sandwich on a bun, vegetable soup, chocolate-chip cookies, and a glass of water. Meal sizes were determined by having a group of pilot participants construct what they considered to be a small meal and a large meal. The small meal consisted of two turkey-and-cheese sandwich quarters, a half-bowl of vegetable soup, two chocolate-chip cookies, and a glass of water (~530 kcal); the large meal consisted of five turkey-and-cheese sandwich quarters, a full-bowl of vegetable soup, four chocolate-chip cookies, and a glass of water (~1200 kcal).<sup>a</sup> The small- and large-meal videos were scripted so that they could be matched on duration, number of bites, and amount of food consumption shown. This matching was accomplished by inserting cuts in the videos during which some food was removed from the dishes; more food was removed in the large-meal video than in the small-meal video. The target individual consumed all of the food that she had in front of her. Each video was ~5 min and 15 s in length. Written descriptions (~250 words in length) were based directly on the videos so that they provided approximately the same information as the video portrayals did, but without the visual image (the descriptions are available from the authors).

Participants were asked several questions about the video/written description (e.g., "What color was the target's shirt?") and were also asked to rate the target on various character traits. Embedded among a set of filler items were the items asking participants to estimate the target's weight (in pounds) and to rate her body size on a 5-point scale (1 = very thin, 5 = very heavy).

Participants also completed the Restraint scale,<sup>22</sup> a 10-item self-report measure of dietary habits and weight fluctuations. Individuals scoring 15 or more on the Restraint Scale were classified as restrained eaters, and those scoring <15 were classified as unrestrained eaters. In the current sample, there were 20 restrained eaters ( $M = 18.00$ ,  $SD = 3.45$ , 12 females) and 54 unrestrained eaters ( $M = 8.46$ ,  $SD = 3.63$ , 27 females).<sup>b</sup> The limited availability of participants

<sup>a</sup> Most of the previous research on meal-size consumption stereotypes has not controlled for food type in the manipulation of meal size. For example, in Chaiken and Pliner's<sup>21</sup> study, one of the small meals consisted of a salad and a coffee whereas one of the large meals consisted of a bowl of soup, spaghetti with meat sauce, a green salad, a chocolate brownie, a banana, and a large soda. Clearly, these meals are as qualitatively different as they are quantitatively different, and this confounding renders the results of previous research on meal-size consumption stereotypes difficult to interpret. In the present study, we were careful to control for the type of food eaten by having the large and small meals consist of the same foods but in differing amounts.

<sup>b</sup> The total Restraint score for three participants could not be calculated owing to missing values. One of these participants was classifiable as unrestrained on the basis of the partially completed Restraint Scale. The other two participants were not included in the analyses that used restraint category as an independent variable.

at the time that this study was run constrained the number of restrained eaters who participated.

**Procedure.** Upon arrival at the laboratory, participants were told that they would be presented with limited information about an individual in a specific situation and that they would then be asked to answer some questions about that individual and the situation. Next, participants were left alone to either watch the video or read the written description. There were 10 restrained eaters and 28 unrestrained eaters in the small-meal condition, and 10 restrained eaters and 27 unrestrained eaters in the large-meal condition. After viewing the video or reading the description, participants completed the trait-rating questionnaire, answered questions about the video or description, and then completed the Restraint Scale. Participants were then debriefed and thanked for their participation.

## Results

**Manipulation Check.** As a manipulation check, participants were asked to recall how many sandwich pieces and how many cookies the target ate. Participants in the small-meal condition estimated the target to have eaten significantly fewer sandwich pieces ( $M = 2.00$  vs.  $M = 4.97$ ) and fewer cookies ( $M = 2.02$  vs.  $M = 3.89$ ) than did participants in the large-meal condition,  $p < 0.001$ . There were no restraint differences in the accuracy of these estimates (i.e., the difference between estimated and actual consumption), with >85% of participants displaying perfect accuracy. Participants were also asked to rate the target on a 5-point scale ranging from 1 (eats very little) to 5 (eats a lot). Not surprisingly, participants rated targets who ate smaller meals as eating significantly less ( $M = 2.53$ ,  $SD = 0.95$ ) than targets who ate larger meals ( $M = 3.87$ ,  $SD = 1.05$ ),  $p < 0.001$ . Again, there was no restraint difference in these ratings.

**Main Analyses.** There was no meal-size by sex-of-rater interaction, nor was there a meal-size by mode-of-target-presentation interaction. Thus, sex and mode of presentation are not discussed in the analyses below. Two-way Analyses of Variance with meal size (small vs. large) and participant restraint status (restrained vs. unrestrained) as independent variables were performed on perceived weight and perceived body size.

**Perceived weight<sup>c</sup>.** Analysis of perceived weight revealed a significant main effect of meal size,  $F(1,$

<sup>c</sup> Examination of target weight ratings revealed one participant whose estimate of the target's weight (160 lb) was almost 4 SD above the mean for other participants in that cell ( $M = 113.46$ ,  $SD = 11.86$ ), even though that participant rated the target at the midpoint of the perceived-body-size (very thin/very heavy) scale. Data from this outlying participant were removed from all analyses.

69) = 5.62,  $p = 0.02$ , qualified by a significant meal-size by restraint-category interaction,  $F(1, 69) = 7.31$ ,  $p < 0.01$ . Simple-effects analysis indicated that restrained eaters perceived targets who ate smaller meals as weighing less ( $M = 114.94$ ,  $SD = 11.86$ ) than targets who ate larger meals ( $M = 130.25$ ,  $SD = 13.04$ ),  $F(1, 69) = 8.70$ ,  $p < 0.005$ ,  $d = 1.23$ . Unrestrained eaters were not affected by meal size in their judgments of targets' weight (Fig. 1a). Further analyses of simple effects revealed that the difference in weight ratings between restrained and unrestrained eaters was greater in the small-meal condition,  $F(1, 69) = 4.59$ ,  $p < 0.04$ ,  $d = 0.95$ , than it was in the large-meal condition,  $F(1, 69) = 2.80$ ,  $p < 0.10$ ,  $d = 0.55$ .

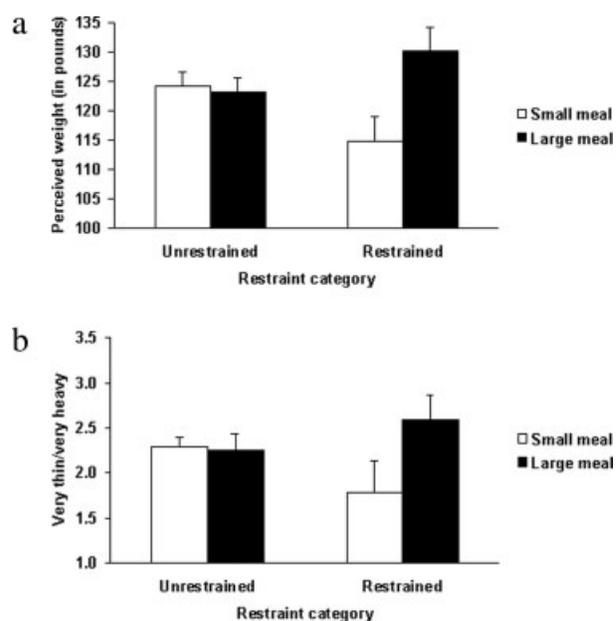
**Perceived body size.** The pattern of results for body-size ratings was similar to that for perceived weight. There was a marginal main effect of meal size,  $F(1, 70) = 3.33$ ,  $p = 0.07$ , qualified by a meal-size by restraint-category interaction,  $F(1, 70) = 3.79$ ,  $p = 0.056$ . Importantly, simple-effects analysis indicated that restrained eaters perceived targets who ate smaller meals as being thinner ( $M = 1.78$ ,  $SD = 1.09$ ) than targets who ate larger meals ( $M = 2.60$ ,  $SD = 0.84$ ),  $F(1, 70) = 4.78$ ,  $p = 0.03$ ,  $d = 0.85$ . Meal size did not affect unrestrained eaters' judgments of targets' body size (Fig. 1b).

## Discussion

Consistent with previous research, we found that judgments of body weight and size are influenced by the amount of food that an individual eats. Of particular importance, we found that the effect of meal size on judgments of targets' body weight and size was evident only among restrained eaters. That is, restrained eaters perceived women who ate smaller meals as weighing less and being thinner than they did women who ate larger meals, but unrestrained eaters did not. The fact that this bias among restrained eaters was observed in the context of making judgments of other people suggests that it is relatively pervasive.

The findings of Study 1 are not simply attributable to increased focus on food intake on the part of restrained eaters; there were no differences between restrained and unrestrained eaters in the accuracy of their reports of targets' food intake. It also does not appear that unrestrained eaters, who might have relatively little experience judging body weight, simply attributed an arbitrary "average" weight to the target. Vartanian et al.<sup>23</sup> found that the weight that college students attributed to "the average female undergraduate" (129 lb) is heavier than the weight that unrestrained eaters attributed to target individuals in Study 1 (124 lb) ( $t = 3.59$ ,  $p < 0.002$ ). This

**FIGURE 1.** (a) Judgments of targets' body weight as a function of meal size and participant restraint status. (b) Judgments of targets' body size as a function of meal size and participant restraint status. Error bars depict standard error of the mean.



finding suggests that unrestrained eaters in the present study did consider the target's body size in making body-weight judgments, even though they did not make use of the food-intake information.

It is also noteworthy that the restrained/unrestrained-eater difference, at least for perceptions of weight, was somewhat stronger for small meals than it was for large meals; that is, compared with unrestrained eaters' weight ratings, restrained eaters perceived targets who ate smaller meals as weighing less (a 10-lb difference) to a greater degree than they perceived targets who ate the larger meals as weighing more (a 7-lb difference).

Overall, Study 1 provided some preliminary evidence that restrained eaters are influenced by meal-size information in making judgments of other people's body weight and size, whereas unrestrained eaters do not.<sup>d</sup> Because this was a novel finding, Study 2 attempted to replicate this effect using a different

<sup>d</sup> It is possible that, in addition to the absolute meal size, the manner in which the food was presented also influenced judgments of the target. Specifically, the amount consumed in the small-meal condition (two sandwich quarters, or half a sandwich) might have also been perceived as being "less than a usual amount," and the amount consumed in the large-meal condition (five sandwich quarters, or more than one entire sandwich) might have been perceived as being "more than a usual amount." Future research could examine how the presentation of food consumed (e.g., half a large sandwich vs. a whole small sandwich) influences judgments based on food intake.

procedure. Specifically, we were interested in whether restrained and unrestrained eaters would be more or less likely to identify a thinner or heavier individual as the one whom they had just seen eating a small or large meal. In addition, because of the limited number of restrained eaters in Study 1, we wanted to demonstrate that this finding was reliable. On the basis of the results of Study 1, we expected that restrained eaters would be more likely to select the thinner person after seeing her eat a small meal, and would be more likely to select the heavier person after seeing her eat a large meal. In contrast, we expected that unrestrained eaters would be uninfluenced by meal size in their selection of the thinner or heavier person. We also expected, as in Study 1, that the restrained-unrestrained difference would be more pronounced in the small-meal condition than in the large-meal condition.

## Study 2

### Method

**Participants.** Eighty-three female undergraduate students from an introductory psychology course at the University of Toronto participated in exchange for course credit. The mean age was 22 years (range = 18–42). Participants were classified as restrained or unrestrained eaters on the basis of their responses on the Restraint Scale. In the present study, there were 40 restrained eaters ( $M = 20.70$ ,  $SD = 3.84$ ) and 43 unrestrained eaters ( $M = 10.26$ ,  $SD = 3.18$ ).

**Materials and Procedure.** Participants were pre-selected on the basis of their responses to the Restraint Scale, which they completed during a mass-testing session at the beginning of the school year. Each participant was presented with two video clips: the first was of a male target wrapping a gift (control video), and the second was of a female target eating lunch (critical video). For the critical video, we used the videos from Study 1. Half of the participants saw the target eat a small meal; the other half saw the target eat a large meal.

Participants first viewed the control video, which was followed by a delay task (a digit-span task), and participants were then asked to answer a series of questions about that video. For each question, participants were presented with a card consisting of a pair of photographs; one photograph depicted an object that appeared in the video, and the other depicted a similar object that did not appear in the video. Participants were asked to select the object that appeared in the video (e.g., “Which hat was the individual in the video wearing, A or B?”).

After answering the questions from the control video, participants viewed the critical video, completed a delay task (another digit-span task), and answered a similar series of questions about the critical video. Among these questions was a question asking participants to select from two photographs of a woman’s body (cropped to the neck so that her head was not shown) the one depicting the woman whom they had seen in the video. Both photographs actually depicted the individual in the video, but the photographs were distorted using image-editing software such that one photograph depicted the individual as 5% thinner than she actually was, and the other as 5% heavier than she actually was. Thus, participants could not (unbeknownst to them) choose the individual as she was actually depicted in the video, and the question of interest was whether participants would choose the thinner target or the heavier target as the one whom they had seen in the video.

Finally, participants were asked to complete the Restraint Scale to verify their restraint status, and were debriefed and thanked for their participation.

### Results

Chi-square analyses were used to examine the proportion of restrained and unrestrained eaters who selected the thin target in the small-meal condition and in the large-meal condition. Before examining these selections as a function of meal size, however, we established baseline expected values by having a separate group of participants view a still image of the target individual from the small- or large-meal video without any meal-size information present in the image. After viewing the still image, participants were asked to identify which of the target individuals (i.e., the thinner or the heavier) was the one who was in the video. In the small-meal-video condition, the baseline participants displayed a strong tendency to select the heavier target, with only 13% of restrained eaters and 8% of unrestrained eaters selecting the thin target; the two groups did not differ in these proportions,  $\chi^2(1, N = 29) = 1.33$ ,  $p > 0.2$ . In the large-meal-video condition, baseline participants were also likely to select the heavier target, with only 36% of restrained eaters and 29% of unrestrained eaters selecting the thin target;<sup>e</sup> again, the two groups did not differ signifi-

<sup>e</sup>In one segment of the large-meal video, the target had her sleeves partially rolled up, which seems to have slightly disambiguated her weight, making her look thinner. For this reason, separate still images were selected for baseline assessments in each video condition to reflect the sleeve difference between the large-meal video (sleeves rolled up) and the small-meal video (sleeves down). The influence of the rolled up sleeves is evident in the higher baseline frequency of selecting the thinner target in the large-meal-video condition compared with the small-meal-video condition.

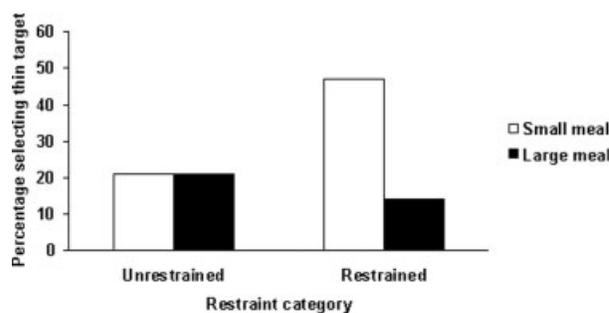
cantly,  $\chi^2(1, N = 31) = 1.12, p > 0.2$ . These proportions were used as the expected values in the chi-square analyses.

In the small-meal condition, restrained eaters (60%; 47% above baseline) were more likely than were unrestrained eaters (29%; 21% above baseline) to select the thinner target,  $\chi^2(1, N = 41) = 51.14, p < 0.001$ . In the large-meal condition, restrained eaters selected the thin target 50% of the time (14% above baseline); unrestrained eaters also selected the thin target 50% of the time in this condition (21% above baseline),  $\chi^2(1, N = 42) = 6.62, p < 0.02$ . Thus, restrained eaters' judgments of body size were affected by meal size in the predicted direction; although this effect was relatively weak (60% selecting the thinner target in the small-meal condition vs. 50% in the large-meal condition), its magnitude was considerably greater when calculated against the baseline values (+47% vs. +14%), which were affected by the minor clothing discrepancy.<sup>e</sup> As expected, unrestrained eaters did not show this same effect of meal size on body-size judgments, either directly (29 vs. 50% for small and large meals, respectively) or relative to baseline expectancies (+21% in both cases) (Fig. 2).

### Discussion

The results of Study 2 are consistent with those of Study 1 in showing that meal size has a stronger influence on restrained eaters' judgments of body size than on unrestrained eaters' judgments. Restrained eaters showed the expected effect of meal size on body-size judgments (a 10% effect in absolute terms and a 33% effect relative to baseline), whereas unrestrained eaters showed a reverse effect (-21%) in absolute terms and a null (0%) effect relative to baseline. Although the findings of Study 2 are consistent with our hypotheses, it should be noted that the baseline values were established from a single still image from each video, and it is possible that the still images used were not fully representative of the information available to participants watching the entire video. As in Study 1, it appears that restrained eaters were more affected by the small meal than by the large meal when making body-size judgments. Again, this bias occurred when making judgments of other people, a finding that challenges the assumption that cognitive biases among weight-preoccupied individuals are limited to the self. Taken with the findings of Study 1, the findings of Study 2 suggest that judgments of body weight and size based on meal size are influenced by a pervasive cognitive bias among restrained eaters.

**FIGURE 2.** Proportion of restrained and unrestrained eaters (above baseline) selecting the thinner target as a function of meal size.



### Conclusion

Cognitive biases related to food and weight have been well documented among individuals with body-weight and -shape concerns, but the generality or pervasiveness of these biases has been less well established. The present research examined the extent to which restrained eaters use meal-size information in making judgments of other people's body weight and size. Study 1 found that restrained eaters perceived women who ate smaller meals as weighing less and being thinner than women who ate larger meals, but unrestrained eaters did not. The same pattern of results was found in Study 2, with restrained eaters selecting a slimmer body size to represent a woman who had eaten a smaller meal. Previous research has also found that judgments of weight are influenced by meal size,<sup>20,21</sup> but the present research is the first to specifically examine these judgments among restrained eaters. Our findings suggest that it is restrained eaters who carry the observed effects of meal-size information on judgments of body weight and size. Our findings are also consistent with a growing body of research<sup>12-15</sup> suggesting that cognitive biases among eating disordered individuals might be more generally applied than previously thought. Taken together, these studies challenge the assumption that biases related to food and weight are limited to the self, and suggest that restrained eaters are influenced by a pervasive cognitive bias relating food intake to body weight and body size.

Of course, all else being equal, the more an individual eats the heavier she or he will become. What is important to consider in the context of the present research, however, is that there were group differences in the use of meal-size information in body-weight judgments. Restrained eaters use meal-size information in making judgments of body weight and size, whereas unrestrained eaters

do not. Moreover, judgments of the same target individual varied across meal-size conditions, and were based on evidence of her food intake on only a single occasion. Thus, restrained eaters might well be using a reasonable and valid heuristic, but their application in certain cases is inaccurate, leading to systematic biases in their judgments of body weight and size (cf. Tversky and Kahneman<sup>24</sup>). The findings of the present research, therefore, provide us with some added insight into how restrained and unrestrained eaters make use of food- and weight-related information.

We also found a noteworthy (but unexpected) asymmetry—Restrained eaters appear to be more strongly influenced by smaller meals than by larger meals in their judgments of body weight and size. This finding suggests that restrained eaters might in some respects be more focused on thinness (and the means through which one can achieve thinness—namely, eating minimally) than they are on fatness (and the means through which one can avoid fatness—namely, avoiding eating to excess). The asymmetry in body-weight judgments, however, does not appear to translate into a greater focus on achieving thinness (vs. avoiding fatness) in motivational or behavioral terms among restrained eaters. We have demonstrated elsewhere<sup>25</sup> that restrained eaters are just as motivated to avoid gaining weight (and to prevent the negative outcomes associated with fatness) as they are to lose weight (and to achieve the positive outcomes associated with thinness). Future research is needed to more fully understand the commonalities and differences between cognitive biases (including body-weight judgments) on the one hand, and motivation and weight-related behaviors on the other.

Although our results indicate that restrained eaters exhibit a bias in their judgments of body weight based on food intake, we have not addressed the mechanism underlying this bias. One possible mechanism has to do with people's personal beliefs. Specifically, restrained eaters might simply have stronger beliefs about the connection between food intake and body weight than do unrestrained eaters. According to Dweck's implicit person theory,<sup>26</sup> some individuals are predominantly incremental theorists and believe that personal attributes (such as intelligence) are malleable, whereas other individuals are predominantly entity theorists and believe that personal attributes are essentially fixed and unchangeable. Extending this theory to the current context, we might reason that restrained eaters (like incremental theorists) believe that body weight is malleable and hold strong beliefs about a direct connection between

the amount of food one eats and one's body weight and size. This assumption makes sense in light of the fact that they attempt to restrict their food intake in an effort to control their body weight and size. If they did not hold such beliefs, what would be the point of dieting? In fact, dieting itself seems predicated on the belief that one's body weight and shape are readily changeable.<sup>27</sup> In contrast, unrestrained eaters (like entity theorists) might believe that body weight is essentially fixed (and perhaps genetically determined). Thus, although they might also have some concerns about their body weight and size, unrestrained eaters might be less convinced that they can control them by modifying their food intake; even if they wanted to lose weight, they might be less inclined to do so by dieting. Consistent with this hypothesis, Vartanian and Herman<sup>28</sup> found that, for restrained eaters, the more they believed that the amount of food one eats is a determinant of body weight, the more likely they were to engage in a variety of dieting behaviors (e.g., limiting the number of calories consumed in a day). Thus, restrained eaters might make judgments of other people's weight based on their food intake *because* they believe that the two are directly related, whereas unrestrained eaters refrain from making judgments of other people's weight based on their food intake because they are not convinced that food intake and body weight are directly related. Future research is needed to test the hypothesized mediating role of personal beliefs in body-weight judgments. Such research would be important insofar as identifying the personal beliefs that underlie cognitive biases related to food and weight can help us better understand some of the factors that contribute to the development and maintenance of restricted eating.

The present research was conducted among non-clinical samples of restrained eaters, but the findings do have potential implications for clinical eating disorders as well. Restrained eaters are known to resemble eating-disorder patients in many ways including their dissatisfaction with their bodies and their tendency to alternate between periods of food restriction and bouts of overeating,<sup>29,30</sup> and dietary restraint has been shown to prospectively predict bulimic pathology.<sup>31,32</sup> We therefore would expect eating-disorder patients to exhibit similar (although perhaps more pronounced) biases in their judgments of body weight based on food intake. If this is the case, then future research examining the presence of this bias among eating-disorder patients could be valuable for a number of reasons. Firstly, it would provide us with important information regarding the generality of cognitive biases among

these individuals. Secondly, this bias in judgments of body weight could also have implications for individuals' own eating behaviors. For example, individuals might eat minimally in the presence of others if they believe that those others will in turn perceive *them* as being thinner (a form of impression management), or they might restrict their food intake as a way to bolster their own self-image (including their body image).<sup>16–19</sup> In this way, the cognitive bias that we have described can be an additional factor that contributes to the development or maintenance of disordered eating behavior.

In conclusion, restrained eaters use meal-size information in making judgments of other people's body weight and size. The fact that this bias is apparent in forming judgments of other people speaks to its pervasiveness, and challenges the assumption that cognitive biases among weight-preoccupied individuals are egocentric in nature. Furthermore, this bias is important because it could influence the food intake of restrained eaters or those with clinical eating disorders.

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