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Brief research report

Accuracy in estimating the body weight of self and others: Impact of dietary restraint and BMI

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ABSTRACT

We examined the accuracy of people's estimates of their own body weight and of the body weight of other people. Female undergraduates ($n = 132$) self-reported their weight, were weighed by the experimenter, and completed a measure of dietary restraint. Participants also viewed 10 photographs of women ranging from underweight to obese and estimated their body weight. Individuals high in dietary restraint underestimated their own weight to a greater extent than those low in dietary restraint, but this effect was accounted for by individual differences in BMI: heavier participants underestimated their weight to a greater extent than leaner participants. Participants also underestimated the weight of heavier targets to a greater extent than they did leaner targets, but the degree of inaccuracy was not related to participants' dietary restraint or BMI. These findings support the hypothesis that inaccuracies in self-reported weight reflect deliberate misreporting rather than a cognitive or perceptual bias.

Introduction

There is considerable variability in the extent to which individuals accurately report their own body weight. Heavier individuals underestimate their weight to a greater extent than do leaner individuals (Cash, Counts, Hangen, & Huffine, 1989; Cash, Grant, Shovlin, & Lewis, 1992), and chronic dieters underreport their weight to a greater extent than do non-dieters (McCabe, McFarlane, Polivy, & Olmsted, 2001). Patients with eating disorders, in contrast, tend to show greater accuracy in their self-reported weight (Doll & Fairburn, 1998; McCabe et al., 2001). Identifying the mechanisms underlying the variability in self-reported weight could help researchers and clinicians predict and better understand the consequences of errors in self-reported weight.

It has been suggested that inaccuracies in self-reported weight are not due to cognitive or perceptual biases, but are instead a form of "motivated distortion" in which individuals deliberately misreport their body weight (Cash et al., 1989; McCabe et al., 2001). Cash et al. (1989) found that accuracy in self-reported weight improved when participants expected to be weighed immediately after providing their self-reported weight, which suggests that their participants did have access to more accurate weight information but chose not to report that information unless they thought that their reports were verifiable.

Another approach to testing the motivated distortion hypothesis is to examine whether errors in estimating body weight are limited to estimates of one's own weight or are also observed in estimating the body weight of other people. The cognitive biases observed among weight-preoccupied individuals are generally thought to be uniquely relevant to the self (Vitousek & Hollon, 1990), and we might similarly expect that biased weight estimates would only be observed for reports of one's own weight. There is, however, accumulating evidence that such cognitive biases are more globally applied than previously assumed (e.g., Vartanian, Herman, & Polivy, 2008), and inaccuracies in self-reported weight might therefore reflect a generalized bias in estimating body weight. An initial test of this hypothesis found no evidence of a generalized bias in estimating weight: although restrained eaters (chronic dieters) tend to underreport their weight more than do unrestrained eaters (non-dieters), the groups did not differ in the accuracy of their estimates of other people's weights (Vartanian, Herman, & Polivy, 2004). A limitation of that study, however, was that participants did not report their own weight, and thus it is unknown whether individuals' estimates of their own weight correspond to their estimates of other people's weight.

There is also some ambiguity in the literature regarding the relative role of dietary restraint and BMI in determining (in)accuracies in self-reported weight. One recent study found that the effect of dietary restraint on the accuracy of self-reported weight was accounted for by restraint differences in BMI (Larsen, Ouwens,

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Engles, Eisinga, & van Strein, 2008), but another study found that dietary restraint was associated with self-reported weight estimates independent of BMI (Shapiro & Anderson, 2003). Thus, the relative importance of dietary restraint and of BMI in predicting the accuracy of weight estimates remains unclear.

The two aims of this study were (1) to examine the connection between accuracy in the estimates of one's own body weight and accuracy in the estimates of other people's body weights, and (2) to examine the role of participants' dietary restraint status and BMI in those estimates. Addressing these issues will provide further insight into biases in self-reported weight. We predicted that dietary restraint and BMI would be related to greater underestimation of individuals' own weight. We also expected that participants would underestimate the weight of heavier targets more than the weight of leaner targets. Finally, we examined whether a greater degree of inaccuracy in one's self-reported weight would correspond to a greater degree of inaccuracy in estimating other people's weight, although no firm prediction was made.

Method

Participants

Participants were 132 female undergraduate students at a large private university in the Northeastern United States. Participants' mean age was 18.52 years (range = 18–21) and their mean body mass index (BMI; kg/m^2) was 22.60 (range = 16–32). Participants received credit in their introductory psychology course for participating in this study. This study was approved by the university's Institutional Review Board.

Materials

Images. Participants viewed 10 full-body digital photographs of women whose BMI ranged from 18 to 34. Each woman was dressed in close-fitting gray shorts and a white tank-top, and was photographed in front view against a neutral background. The targets' faces were blurred out to reduce any potential impact of facial attractiveness on ratings of the targets. Each image was standardized to a height of 500 pixels.

Dietary restraint. As in previous studies on accuracy of weight estimates (Larsen et al., 2008; Shapiro & Anderson, 2003; Vartanian et al., 2004), dietary restraint was assessed using the Restraint Scale (Herman & Polivy, 1980). Individuals who score 15 or higher are classified as restrained eaters; those who score 14 or lower are classified as unrestrained eaters. Cronbach's alpha in this study was .82.

Procedure

Participants came to the laboratory individually, and the entire study took place on the computer. After completing an informed consent document, participants provided demographic information, including their age, and their height and weight (unaware that they would have their height and weight measured at the end of the experiment). Next, participants completed the target-rating task. Participants viewed each of the 10 images, presented in random order. Each image was presented individually in the center of the computer screen and remained on the screen until the participant made a response. For each image, the participant was asked to estimate the target's weight in pounds by selecting the corresponding value from a drop-down menu. After completing weight estimates for all of the images, participants completed the Restraint Scale, and had their height and weight measured by the experimenter.

Statistical Analyses

Because the images of the target individuals were standardized to a height of 500 pixels, an adjusted height value was calculated for each target by replacing her actual height with the mean height for all 10 women. The adjusted height and the target's actual BMI were then used to calculate an adjusted weight for the target. The analyses reported below are based on these adjusted weight values (range = 109.59–207.67 lbs). Accuracy in weight estimations for the target individuals and for the participants' own weight were calculated in two ways: First, a simple difference score was calculated by subtracting the actual weight (or adjusted actual weight) from the estimated weight (*signed accuracy*: estimated − actual), with negative values reflecting underestimation and positive values reflecting overestimation. Second, because averaging scores that have opposite signs can obscure the true magnitude of the inaccuracy, an absolute difference score was calculated as the absolute difference between the actual weight (or adjusted actual weight) and the estimated weight (*absolute accuracy*: |estimated − actual|). Using percent inaccuracy to control for the potential confound of actual weight with degree of inaccuracy (Cash et al., 1992) produced identical results and those data are therefore not presented.

Single-sample *t*-tests were used to determine whether accuracy in self-reported weight differed significantly from zero. Hierarchical regression analyses were used to examine the effects of dietary restraint (Step 1), BMI (Step 2), and their interaction (Step 3) on accuracy of self-reported weight estimates. Restraint Scale scores and BMI were mean centered prior to creating the interaction term to control for multicollinearity. Testing the assumptions for regression analyses identified four multivariate outliers who were excluded from the analyses. To assess accuracy in estimating targets' body weight, four groups were created based on the targets' BMI category: underweight (two targets, mean BMI = 18.30), normal weight (three targets, mean BMI = 22.10), overweight (three targets, mean BMI = 27.97), and obese (two targets, mean BMI = 34.05). Repeated measures ANOVAs were conducted with target group as the within-subjects factor, and with dietary restraint (unrestrained vs. restrained) and BMI group (<25 vs. ≥25) as between-groups factors. Finally, correlations were computed to assess the association between errors in estimating one's own body weight and errors in estimating the body weight of target individuals.

Results

Accuracy in Self-Reported Weight

As a group, participants tended to underestimate their weight. The mean signed accuracy for self-reported weight was −4.62 lbs (*SD* = 5.37), $t(130) = -9.85$, $p < .001$, $d = 0.86$; and the mean absolute accuracy was 5.57 lbs (*SD* = 4.37), $t(130) = 14.58$, $p < .001$, $d = 1.28$. In the hierarchical regression analysis, dietary restraint was a significant predictor of signed accuracy at Step 1 ($\beta = -.23$, $p = .01$; $R^2 = .05$), but was no longer significant ($\beta = -.05$, $p = .62$) when BMI ($\beta = -.43$, $p < .001$) was included as a predictor at Step 2 ($\Delta R^2 = .15$, $p < .001$). The interaction between dietary restraint and BMI was not significant. The same pattern emerged when examining absolute accuracy. Dietary restraint was a significant predictor of absolute accuracy at Step 1 ($\beta = .26$, $p = .003$; $R^2 = .07$), but was no longer significant ($\beta = .09$, $p = .31$) when BMI ($\beta = .39$, $p < .001$) was included as a predictor at Step 2 ($\Delta R^2 = .13$, $p < .001$). The interaction between dietary restraint and BMI was not significant.

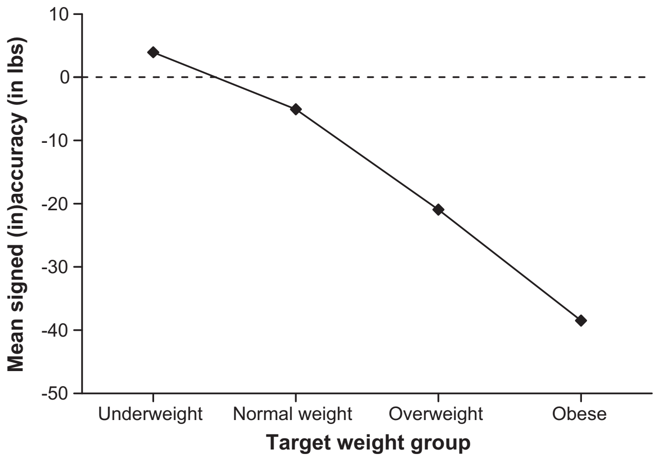

Fig. 1. Mean signed accuracy in estimating targets' weight as a function of target BMI category. A value of zero indicates perfect accuracy.

Accuracy in Estimates of Targets' Weight

Accuracy in estimating targets' body weight varied as a function of targets' body size. For signed accuracy, there was only a main effect of target group, $F(3, 124) = 100.28$, $p < .001$. Follow-up contrasts revealed a greater degree of underestimation of heavier targets than of leaner targets (all $ps < .001$). Single-sample *t*-tests further indicated that participants significantly overestimated the weight of underweight targets ($p < .001$), and significantly underestimated the weight of all other target groups ($ps < .001$) (Fig. 1). For absolute accuracy, there was again only a main effect of target group, $F(3, 124) = 91.06$, $p < .001$. Follow-up contrasts revealed that accuracy in the estimates of underweight and normal-weight targets did not differ ($p = .60$), but that estimates of overweight targets and of obese targets were significantly different from all other groups ($ps < .001$). Single-sample *t*-tests further showed a significant degree of inaccuracy in participants' estimates of all target groups ($ps < .001$) (Fig. 2).

Self-Estimates and Estimates of Others

Accuracy in estimating one's own weight was not significantly correlated with the mean accuracy in estimating the weight of the target individuals ($r_{signed} = -.09$, $p = .32$; $r_{absolute} = -.10$, $p = .25$).

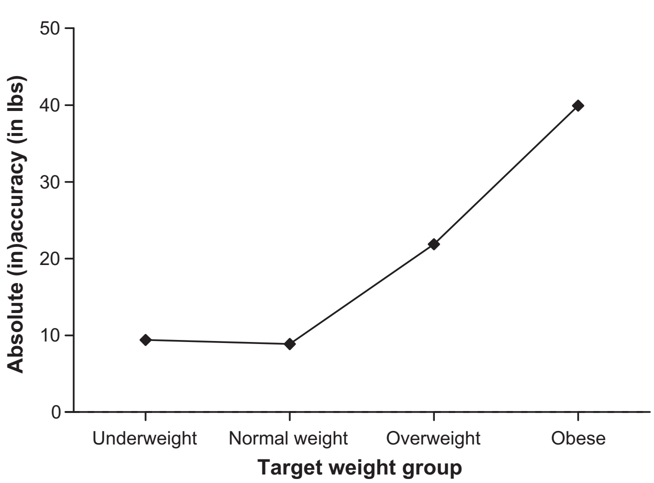

Fig. 2. Mean absolute accuracy in estimating targets' weight as a function of target BMI category. A value of zero indicates perfect accuracy.

Discussion

Participants tended to underreport their weight, but the magnitude of the absolute discrepancies was greater than the magnitude of the signed discrepancies ($d = 0.86$ vs. $d = 1.28$). This finding highlights the value of examining both signed accuracy (which indicates the overall direction of the effect) as well as absolute accuracy (which provides a better indication of the overall magnitude of the effect). The results of the present study also replicate those of Larsen et al. (2008) who found that, although dietary restraint was related to the accuracy of reporting one's own body weight, this effect was rendered nonsignificant when BMI was included in the regression model. Thus, restraint differences in self-reported weight appear to be partly due to the fact that restrained eaters tend to be heavier than unrestrained eaters. When estimating other people's body weight, participants overestimated the weight of leaner targets and underestimated the weight of heavier targets (consistent with Vartanian et al., 2004). In contrast to self-reported weight, however, participants' level of dietary restraint and their own BMI were unrelated to their estimates of other people's body weight.

An important question addressed in this study was whether or not inaccuracies in self-reported weight are a manifestation of a more general bias in estimating weight. There was no correspondence between accuracy of self-reported weight and accuracy in estimating other people's weight. This was somewhat unexpected given that Hundleby, Misumi, van Kampen, and Keating (1992) and Hundleby and Bourgouin (1993) found that errors in the estimates of one's own body size corresponded to errors in estimates of other objects. Perhaps estimates of body *size* and estimates of body *weight* are driven by different processes. Specifically, it might be that errors in estimating body size are based on a cognitive or affective bias that is generalizable beyond the self, whereas errors in self-reported body weight reflect a motivated distortion that is only pertinent to estimates of one's own weight. This possible distinction between judgments of body size and body weight could have implications for helping people correct their biases and should be addressed in future research.

This study provides further support for the view that the underreporting of one's own weight observed among heavier individuals (and restrained eaters) reflects a motivated distortion rather than a perceptual or cognitive bias, because the same biases are not observed when judging other people's body weight. One interpretation of these findings is that heavier individuals might not want to acknowledge (to themselves or to others) that they are as heavy as they are. If this is the case, then some heavier individuals may also underestimate the health risks associated with their excess weight, and may consequently be unmotivated to change their diet and exercise behaviors as a means of managing their weight (Vandelanotte, Duncan, Hanley, & Mummery, 2011).

One limitation of this study is that judgments of the targets' weight were based on two-dimensional images presented on a computer screen. There is evidence that body size estimates can vary depending on whether judgments are made of life-sized vs. reduce-sized images (Holder & Keates, 2006). Thus, it is possible that people's ability to estimate another person's weight would differ if judgments were based on life-sized images, or based on more realistic face-to-face encounters with the target. Another limitation is that the present study focused on a non-clinical sample and only examined variables that predicted *inaccuracy* in weight estimates (i.e., dietary restraint and BMI). Previous research has shown that eating disorder patients are quite accurate in their weight estimates (Doll & Fairburn, 1998), perhaps because they are highly motivated to maintain an accurate perception of their weight and therefore regularly monitor their weight. Even among eating disorder patients, however, there are group differences such that patients with anorexia nervosa tend to slightly overestimate their weight whereas patients with bulimia nervosa tend to slightly underestimate their weight (McCabe et al., 2001), and these differences might also reflect a motivated distortion. Future research with eating disorder subgroups and non-clinical controls would further delineate the motivational processes underpinning accuracy of body weight estimates.

In summary, accuracy in self-reported body weight was related to individuals' own BMI, with heavier individuals underestimating their weight to a greater extent than leaner individuals. Participants also underestimated the weight of heavier target individuals to a greater extent than they did leaner target individuals, but those estimates were unrelated to participants' own BMI (or dietary restraint), and were also unrelated to the accuracy of participants' self-reported weight. These findings provide further support for the hypothesis that inaccuracies in self-reported weight reflect a motivated distortion rather than a cognitive or perceptual bias.

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