Accuracy in the Estimation of Body Weight: An Alternate Test of the Motivated-Distortion Hypothesis

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Abstract: **Objective:** *Inaccuracies in self-reported weight are believed to represent a motivated distortion, but cognitive or perceptual biases have not been excluded. We examined the ability of participants to estimate the weight of a target person as a means of distinguishing between motivated distortions and perceptual biases.* **Method:** *Participants (restrained eaters and unrestrained eaters; women and men) estimated the weight of a target individual, which was compared with the actual weight of the target individual.* **Results:** *Restrained and unrestrained eaters did not differ in their estimates of the target's weight, and men underestimated the target's weight to a greater extent than did women.* **Discussion:** *The pattern of inaccuracies observed does not parallel those found in research on self-reported weight. This observation suggests that perceptual biases do not explain inaccuracies in self-reported weight and that such inaccuracies may be the result of motivated distortions. Issues regarding data analysis and presentation are also discussed. © 2004 by Wiley Periodicals, Inc.* Int J Eat Disord 36: 69–75, 2004.

Key words: *self-reported weight; motivated distortions; perceptual biases*

INTRODUCTION

Research examining the accuracy of self-reported body weight has found that self-reported weight corresponds quite well with measured weight (e.g., Stunkard & Albaum, 1981), but that women (e.g., Betz, Mintz, & Speakmon, 1994), dieters (McCabe, McFarlane, Polivy, & Olmsted, 2001), and heavier individuals (e.g., Cash, Counts, Hangen, & Huffine, 1989; Cash, Grant, Shovlin, & Lewis, 1992) tend to underreport their weight. It has been suggested that this underreporting may reflect a motivated distortion (Cash et al., 1989; McCabe et al., 2001). It remains a possibility, however, that these distortions result from cognitive or perceptual biases, rather than from motivation per se.

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Cash et al. (1989) found that when participants anticipated being weighed immediately after their self-reports, accuracy was greatly improved, suggesting that the underestimation of body weight is deliberate and not due to a cognitive or perceptual distortion. Another way of disentangling motivated distortions from cognitive or perceptual biases would be to examine people's ability to estimate the body weight of others, a task in which self-serving biases should presumably be absent. Using this approach, it may be possible to exclude the role of perceptual distortions in weight estimations. Resolving this issue is the main purpose of the present study.

Methodologic Issues in Weight Estimation Studies

Several different methods of data analysis and presentation have been used in studies of weight estimation, each with associated difficulties. First, research has often found high correlations between self-reported weight and measured weight, but high correlations alone do not guarantee a high degree of accuracy (Betz et al., 1994). For example, McCabe et al. (2001) revealed that the correlations between actual and reported weight were higher for restrained eaters than for unrestrained eaters, even though unrestrained eaters showed greater accuracy in their weight estimates.

Second, the difference between self-reported weight and actual weight has been used as an index of the accuracy of weight estimation. However, when calculating mean difference scores, positive and negative deviations tend to cancel each other out, obscuring the true amount of discrepancy between estimated and actual weight (Bowman & DeLucia, 1992). A reanalysis of the McCabe et al. (2001) data found that, for dieters, the magnitudes of the absolute and signed deviations were virtually identical (7.95 lb vs. 7.78 lb), suggesting that the deviations were predominantly in one direction. For nondieters, however, absolute deviations were considerably larger than were signed mean deviations (4.85 lb vs. 2.33 lb). Thus although signed means provide useful information about the general direction of inaccuracies, absolute means provide a better index of the degree of inaccuracy.

Third, researchers have divided participant samples into subgroups of underestimators, accurate estimators, and overestimators. These studies have found great variability in their reported proportions, with 25%–85% of women underestimating their weight (Betz et al., 1994; Cash et al., 1989, 1992). The variability in these estimates results from differences in how ''accuracy'' is defined (e.g., an exact match vs. within 5 lb). Clearly, the way in which accuracy is operationally defined influences whether the resulting data convey an impression of accuracy or inaccuracy.

The Current Study

The first objective of the current study was to clarify the extent to which inaccuracies in self-reported weight are the result of motivated distortions by examining participants' ability to estimate the body weight of a female target individual. A pattern of results that parallels the pattern found in research on self-reported weight (i.e., with dieters and women underestimating weight) would be suggestive of a cognitive or perceptual distortion. We would not expect a parallel pattern if inaccuracies in self-reported weight are motivated. The second purpose of the current study was to demonstrate that the way in which the data are analyzed and presented can influence the conclusions to be drawn from the data.

METHOD

Participants

Participants were 214 undergraduate students (165 women; 44 men; 5 unspecified) enrolled in second-year psychology courses at the University of Toronto. Participants were classified as dieters (restrained eaters; $n = 75$) or nondieters (unrestrained eaters; $n = 136$) using the Restraint Scale (Herman & Polivy, 1980). Three participants were unclassifiable due to missing data.

Materials and Procedure

Ten color photographs of women's bodies were selected to represent a range of body mass index (BMI) values within the normal range (19–24). Each photograph depicted a woman's body but was cut off at her neck so that her face was not shown. Each model was dressed in close-fitting dark pants and a red long-sleeved top.

Questionnaire packets were distributed during regular class time. These packets included the target-weight-estimation questionnaire, on which participants were asked to estimate the weight and rate the body size (on a 7-point scale) of the target individual (each participant viewed only one photograph). They also indicated on a 7-point scale how confident they were in their estimates of the target's weight and body size. Participants then indicated the weight of ''the average female undergraduate student at the University of Toronto.'' Finally, participants completed the Restraint Scale (Herman & Polivy, 1980).

RESULTS

Adjusted Body Weight

To control for variations in perceived weight as a function of height, an adjusted weight (in pounds) was calculated for each target by replacing her actual height with the mean height for the group. The adjusted height and the target's BMI were used to calculate an adjusted actual weight for that target. All reported analyses are based on these adjusted actual weights (range, 105–131 lb).

Accuracy of Body Weight Estimation

The mean difference between estimated and adjusted actual target weight served as an index of accuracy of weight estimation. Underestimation was indicated by negative scores. In contrast to research on self-reported weight, restrained ($M = -0.75$, $SD = 12.29$) and unrestrained eaters ($M = -0.41$, $SD = 10.44$) did not differ in their ability to estimate the target's body weight, $t < -1$, not significant. The mean difference score for each group did not differ from zero, ts < 1, not significant. In contrast to research on self-reported weight, men ($M = -3.95$, $SD = 10.42$, $t_{(43)} = -2.51$, $p < .02$), but not women ($M = 0.31$, $SD = 11.13$, $t < 1$, not significant), underestimated the target's weight.

Absolute Differences

For restrained eaters, the mean absolute deviation was 9.91 lb ($SD = 7.21$). For unrestrained eaters, the mean absolute deviation was 8.32 lb ($SD = 6.28$). These absolute

deviation scores differed from zero for both restrained and unrestrained eaters, $t_{(74)} = 11.90$, $p < .001$ and $t_{(135)} = 15.44$, $p < .001$, respectively, but the groups still did not differ in their estimates, $t_{(209)} = 1.67$, $p < .1$. The mean absolute deviation was 8.73 lb ($SD = 6.88$) for women and 9.40 lb ($SD = 5.83$) for men. These mean values did not differ from one another, $t < 1$, not significant. Again, it is evident from these results that signed deviations indicate the direction of inaccuracy whereas absolute deviations provide a better index of the degree of inaccuracy.

Correlations between Estimated and Adjusted Actual Weight

In the current study, the overall correlation between estimated and adjusted actual weight of the targets was small and did not reach statistical significance, $r_{(212)} = .12$, $p < .08$. The correlation did reach significance for male participants, $r_{(42)} = .32$, $p < .04$, but not for female participants, $r_{(163)} = .09$, not significant.

Correlations with Degree of Discrepancy

The degree of discrepancy (estimated weight − adjusted actual weight) was highly, and negatively, correlated with adjusted actual weight of the targets, $r_{(212)} = -.62$, $p < .001$. The result was identical when we used a percent-inaccuracy score to control for the potential confound of adjusted actual weight with degree of inaccuracy (see Cash et al., 1992). The heavier the target, the more her weight was underestimated. There was no correlation between participant restraint score and degree of discrepancy, nor between confidence ratings and degree of inaccuracy.

Underestimators, Accurate Estimators, and Overestimators

Chi-square analyses were used to examine the proportion of participants who were underestimators, accurate estimators, and overestimators based on both criteria for accuracy (i.e., exact matches rounded to the nearest pound and estimates within 5 lb). With the more stringent accuracy criterion, about 60% of participants underestimated the targets' weight, whereas approximately 40% overestimated the targets' weight. (Very few participants were perfectly accurate.) There were no group differences in this distribution. With the less stringent criterion, participants were about equally distributed among the three estimator categories, with one exception: Male participants were more likely to underestimate (50.0%) and less likely to overestimate (18.2%) the targets' weight, $\chi^2_{(1,\ N=44)} = 6.23$, $p < .04$.

Rating of Target Body Size

There were no differences as a function of participant restraint status or sex with respect to ratings of targets' body size, $t < 1$ and $t_{(207)} = -1.50$, respectively, not significant. Overall, participants rated the targets as being slightly below the mid point on the rating scale ($M = 3.40$, $SD = 0.73$). There was a significant correlation between ratings of targets' body size and estimates of targets' weight, $r_{(212)} = .27$, $p < .001$, but the correlation between body size estimates and discrepancy scores was negligible, $r_{(212)} = .04$, not significant.

Estimate of Average Body Weight

There were no group differences (either of restraint or sex) in participants' estimates of the body weight of the average female undergraduate student at the University of Toronto. All groups estimated the average female to weigh approximately 129 lb. This average weight ($M = 128.80$, $SD = 10.36$) is approximately 10 lb heavier than the average estimate of targets' weight ($M = 118.16$, $SD = 8.85$), $t_{(213)} = 14.32$, $p < .001$, which suggests that participants were not simply ascribing an assumed average weight to the targets.

DISCUSSION

The main purpose of the current study was to test the motivated-distortion hypothesis of self-reported weight estimations by examining people's ability to estimate the body weight of another person. In contrast to research on self-reported weight, restrained and unrestrained eaters did not differ in the accuracy of their estimation of target individuals' weight. Furthermore, it was men, not women, who significantly underestimated the targets' weight. These findings suggest that people's underestimates of their own body weight are motivated rather than due to cognitive or perceptual distortions. Similar conclusions have been suggested by the finding in research on body size estimates that distortions are due to affective rather than perceptual factors (Gardner & Bokenkamp, 1996).

Motivation to Underreport

It has been argued that the motivation for misreporting one's weight may take one of two forms: a self-presentational motive, to impress on others that one is lighter than one really is (Cash et al., 1989), or a self-image–enhancing motive aimed to make an individual feel better about herself or himself (McCabe et al., 2001). The first of these goals, presenting oneself to others as lighter than one actually is, is based on the assumption that one will be evaluated more favorably (or at least less unfavorably) at a lighter weight. The finding that people are much more accurate in their estimations when they anticipate subsequent verification of their weight supports the hypothesis that people are actively misreporting their weight (Cash et al., 1989). In addition, the finding of the current study that people's estimates of body weight were inaccurate by an average of 9 lb suggests that body weight may be a sufficiently ambiguous stimulus that misrepresenting one's weight may actually be successful, provided the misrepresentation is not too extreme.

Alternatively, people may misconstrue their weight for self-image–enhancing purposes (i.e., to make themselves feel better; McCabe et al., 2001) and may come to believe that they weigh less than they actually do. Although this underreporting may be directed at enhancing one's self-esteem, it may backfire, leading to a decrease in self-esteem and body esteem and to depression (for example, when a discrepancy between one's expected weight and the weight displayed on the scale leads one to conclude that one has gained weight). McFarlane, Polivy, and Herman (1998) found that restrained eaters who were told that they weighed 5 lb less than they actually did failed to show improvements in their self-esteem or mood (presumably because this lower weight is closer to what they believe their true weight to be).

Although it is likely that the underreporting of weight observed among women and dieters is motivated, further research is needed to clarify which of the two motives

described above more accurately reflects the goals of individuals who underreport their weight, as well as the processes or mechanisms involved in the distortions.

Data Analytic Considerations

Overall, the findings of the current study suggest that whether people are accurate in estimating body weight depends on how accuracy is measured. The absolute differences between estimated and adjusted actual weight were much larger than were the signed differences and the correlation between estimated and adjusted actual weight was quite small. These results indicate that mean (signed) differences in accuracy may be misleading. Interestingly, in the current study, it was men, not women, who underestimated the weight of the targets. Together with the finding that women underestimated the weight of male targets (Flin & Shepherd, 1986), it is possible that people tend to underestimate the weight of cross-sex targets, perhaps because of lack of experience or because they are using themselves (or their own sex) as a point of reference. This is an area that deserves further study.

The most robust finding with regard to weight estimation, observed in studies of self-reported weight as well as in the current study, is that the degree of underestimation of weight increases as a function of actual body weight. That this relation was found in people's estimations of a target's weight (even when we used percent inaccuracy) suggests that this phenomenon may, in part, be the result of perceptual or cognitive errors rather than motivated distortions. However, Cash et al. (1989) found that the relation between body weight and the degree of inaccuracy emerged only when participants were not anticipating subsequent verification of their reported weight. It seems that if there is a cognitive or perceptual component to the relation between actual weight and estimated weight, this component can be overridden by other motives.

The ways in which accuracy data are analyzed and presented influence the conclusions that may be drawn from the data. To arrive at a sound conclusion regarding the accuracy of weight estimations, it is necessary to incorporate multiple methods of data analysis, including at minimum both signed and absolute deviations.

Other research has shown evidence of increased accuracy of self-reported weight among eating-disordered patients (Doll & Fairburn, 1998; McCabe et al., 2001). It would be worthwhile for future research to examine the ability of eating-disordered patients to judge the weight of target individuals to further distinguish between the motivational and perceptual components of accuracy and inaccuracy. In a similar vein, it would also be important for future research to compare the accuracy of self-reported weight with the accuracy estimation of targets' weight within the same sample of participants as a means of further disentangling the processes involved in weight estimations.

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