


ORIGINAL ARTICLE

Extreme under-reporting of body weight by young adults with obesity: relation to social desirability

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Summary

Objective

The objective of this study was to determine whether there is an association between under-reporting of body weight and social desirability as is found with self-reports of energy intake.

Methods

Twenty-seven lean individuals (mean body mass index \pm standard deviation = $21.6 \pm 2.0 \text{ kg m}^{-2}$) and 26 individuals with obesity (mean body mass index = $35.4 \pm 4.8 \text{ kg m}^{-2}$) were e-mailed a questionnaire on which they had to state their body weight and conduct a home food inventory. The next day, research team members went to their homes to weigh the participants, conduct their own food inventory and administer the Marlowe–Crowne scale for social desirability.

Results

Among individuals with obesity, lower social desirability scores were associated with a greater degree of under-reporting body weight ($r = +0.48, p < 0.02$). Among lean individuals, the correlation was negative but statistically non-significant ($\rho = -0.22, p > 0.10$). Nine individuals with obesity were extreme under-reporters (2.27 kg or more), and eight of these had social desirability scores in the bottom half of the Marlowe–Crowne scale ($p < 0.01$). Six under-reported on the home food inventory by three or more items.

Conclusions

Individuals with obesity and low social desirability scores are more likely than others to be extreme under-reporters of body weight, possibly due to a lack of awareness of their own weight.

Keywords: Body weight, home food inventory, self-reports, social desirability.

Introduction

Nearly 40% of adults in the USA are obese (body mass index [BMI] $> 30 \text{ kg m}^{-2}$), and another third are overweight (BMI $> 25 \text{ kg m}^{-2}$) (1). The negative health outcomes are numerous and common (2). Lifestyle modification (including caloric restriction), recommendations to increase physical activity and behavioural modification are the most frequently used approaches to weight loss.

To effectively deal with this problem, health professionals rely heavily on self-reports of diet and exercise. However, in a thorough review of the literature, Archer

et al. (3) concluded that information provided through self-reports of energy intake (e.g. questionnaires and interviews) have little resemblance to actual intake. Self-reported data in human nutrition research have been called implausible (4). People frequently under-report energy intake by 30% or more (5–7), with some individuals under-reporting to such an extent that they are referred to as ‘extreme under-reporters’ (8). Studies additionally show that individuals tend to under-report their body weights (9–18) and over-report their heights (9,12) and the amount of time engaged in exercise (19).

Archer *et al.* (3) have demonstrated that memory-based dietary assessments are prone to several 'intentional and unintentional distorting factors' (p. 3) including false memories (unintentional); response bias due to social desirability (intentional); and perceptual, coding and retrieval errors. Several studies have found an association between under-reporting of energy intake and social desirability (20–27), i.e. 'the need of [individuals] to obtain approval by responding in a culturally appropriate manner' ((28), p. 353). People who have high social desirability may deceive others in self-reports of behaviour in order to make themselves look better (29). Individuals with obesity are particularly prone to under-report their energy intake (5,8,25,30–33). The extent of the under-reporting becomes greater with each incremental increase in BMI (31) and is specific to high-fat and high-sugar foods; protein consumption is over-reported (34,35). King *et al.* (36) found that unlike lean individuals, many individuals with obesity even under-report when taking an inventory (not from recall) of high-calorie foods in their homes.

Self-reports of body weight might be of particular interest to both researchers and practitioners because of the ease of checking accuracy. For self-reports of body weight, errors can be due to faulty recall, not having weighed oneself in a while and differences in the calibration of the scales used by the participants and the researchers, or errors can be deliberate because of social desirability. However, little is known about the relationship between social desirability and misreporting of weight. In a review of data from the National Health and Nutrition Examination Survey, Burke and Carman (9) concluded that misreporting of body weight provided 'robust evidence of social desirability bias' (p. 198), but they did not actually measure social desirability. In the only study that has, Larson (12) found that the discrepancy between actual weight and self-reported weight was significantly correlated with social desirability scores in young normal-weight women but not in men. Individuals with obesity were not included in the study. The present study differs from the Larson study and previous studies of energy intake in that it directly compared lean individuals (BMI < 25 kg m⁻²) with individuals who have obesity (BMI > 30 kg m⁻²).

Particular focus was given to those individuals who were extreme under-reporters of body weight. Extreme under-reporting of body weight is unlikely to be due to chance or scale calibration differences. Previous studies found that self-reports of body weight were lower than actual weights by a mean of about 1 to 1.8 kg (10,11,14), with only 20% under-reporting by more than 2 kg (18). For the present study, under-reporting was considered to be extreme if the difference was 2.27 kg (5 pounds) or more.

Methods

Participants

Participants were 53 college students attending a south-east public university enrolled in a junior-level human sexuality course. The study included two groups: lean individuals (BMI < 25 kg m⁻²) and individuals with obesity (BMI > 30 kg m⁻²). Lean participants (*N* = 27) were aged 19 to 29 years (20.8 ± 1.9) and included 19 women and 8 men (22 Caucasians and 5 African-Americans). Participants with obesity (*N* = 26) were aged 19 to 25 years plus one 45-year-old participant (21.6 ± 3.0) and included 15 women and 11 men (20 Caucasians, 4 African-Americans and 2 Asian Americans). All participants lived in a house or apartment (no dormitory or group housing) and did not use a meal plan and were paid \$30 for participating in the study.

Procedure

The study consisted of two parts. In part 1, the participants were e-mailed a questionnaire, which included their body weight and an inventory of high-calorie foods kept in the home. These had to be completed before the start of part 2, a home visit the next day by two or more members of the research team. Team members weighed the participants on a calibrated scale, administered their own inventory of high-calorie foods in the home and also administered a questionnaire to measure social desirability. The questionnaire was not identified as a measure of social desirability. Body weights were measured without the participants wearing shoes, jackets or other heavy clothing. Participants were not told the purpose of the home visit in advance. None chose to withdraw from the study. The study was approved by the university's Institutional Review Board.

Measures

Social desirability was ascertained by use of the 33-question (18 keyed as true and 15 as false) Marlowe-Crowne scale developed by Crowne and Marlowe (28). High scores indicate a high level of social desirability, whereas low scores indicate lower levels of social desirability. This is a frequently used scale (cited over 5,280 times) for which the behaviours are 'culturally sanctioned and approved but which are improbable of occurrence' and have 'minimal pathological or abnormal implications' ((28), p. 350). Example question: 'I am always courteous, even to people who are disagreeable'.

The home food inventory was developed by King *et al.* (36) as an easy-to-administer, quick (12–20 min)

inventory. It includes seven categories of common, high-calorie foods (45 total) plus the presence of alcohol. Interrater reliability was determined to be 0.93.

Results

Mean BMI (\pm standard deviation) was $21.6 \pm 2.0 \text{ kg m}^{-2}$ for the lean group and $35.4 \pm 4.8 \text{ kg m}^{-2}$ for the group with obesity. For 13 of the individuals with obesity, BMI was 35 kg m^{-2} or greater. The mean scores (\pm standard deviation) on the Marlowe–Crowne Social Desirability Scale were 17.7 ± 4.2 for lean participants (range: 4–25) and 15.4 ± 5.3 for the participants with obesity (range: 4–29) ($t = 1.62$, $p > 0.10$). The overall mean was 16.5 ± 4.9 . Difference scores (in pounds) were calculated between self-reported body weights and weights measured by research team members (negative signs were assigned to difference scores resulting from self-reported weights that were less than those recorded by the research team, and positive numbers were assigned to difference scores resulting from self-recorded weights that were greater than those recorded by the team). For the lean group, there was no statistically significant relation between the body-weight difference scores and scores on the Marlowe–Crowne scale ($r = -0.22$, $p > 0.10$). However, for the participants with obesity, the correlation was significant: low scores on the Marlowe–Crowne scale were associated with a greater degree of under-reporting ($r = +0.48$, $p < 0.02$).

Among the lean participants, 16 of the 27 under-reported their body weight by 0.45 kg or more, but only three were extreme under-reporters (-2.27 , -3.12 and -5.90 kg; Table 1). Among the participants with obesity, 18 under-reported their body weight, and nine of these were extreme under-reporters (-2.72 , -2.72 , -3.63 , -3.63 , -4.99 , -6.80 , -8.16 , -13.61 and -16.33 kg). Dividing the Marlowe–Crowne scale into two halves, 1–16

(below the overall mean) and 17–33 (above the overall mean), eight of the nine extreme under-reporters among the group with obesity were in the bottom half of the scale ($\chi^2 = 11.87$, d.f. = 3, $p < 0.01$, $\phi = 0.47$; six women and two men). Of the 11 individuals with obesity whose score on the Marlowe–Crowne scale was in the range 17–29, seven also under-reported their body weights, but five of them by only 0.91 kg or less. Three lean individuals over-reported their body weight by 2.27 kg or more ($+3.63$, $+4.54$ and $+4.99$ kg). Among individuals with obesity, only five over-reported their body weight, and none were extreme over-reporters ($+0.45$, $+0.73$, $+1.36$, $+1.81$ and $+1.81$ kg).

Errors occurred in six of the home food inventories (one team member under-reported), and thus, it was not possible to conduct a full statistical analysis as was performed with body weight. However, among the 27 lean participants, only six (22.2%) under-reported the number of high-calorie food items in their homes, and only two of these under-reported by more than two items (-3 and -5). Among the 26 participants with obesity, 14 (53.8%) under-reported ($\chi^2 = 5.64$, d.f. = 1, $p < 0.025$, $\phi = 0.33$), and nine of these under-reported by more than two items (-3 , -3 , -3 , -4 , -5 , -6 , -6 , -10 and -11). These nine included six who had been extreme under-reporters for body weight.

Discussion

The direction and magnitude of the correlation between accuracy of self-reported body weights and social desirability among the lean participants (-0.22 , higher social desirability scores associated with a greater degree of under-reporting) was consistent with what has been reported previously for accuracy of self-reports of energy intake and social desirability (20–27). The latter studies included participants with a full range of BMI scores, from lean individuals to individuals with obesity (mean BMI scores ranged from 23.6 to 28.7 kg m^{-2}), and the strongest reported correlation was -0.34 (26), with others reporting correlations of -0.25 or less (20). The present results were not statistically significant, possibly due to sample size.

Larson (12) found a correlation of $+0.51$ between misreporting of body weight and Marlowe–Crowne scores among young, healthy women (mean BMI = 22.4 kg m^{-2}). Misreported weights were calculated as (actual weight minus reported weight), and thus, under-reporting resulted in a positive value, whereas in the present study, under-reported weights had negative values in calculating the correlation coefficient. Therefore, the direction of the associations between misreported body weight and social desirability scores in the present

Table 1 Number of participants who under-reported, accurately reported or over-reported

	Lean participants (<i>N</i> = 27)	Participants with obesity (<i>N</i> = 26)
Body weight		
Under-reporters (extreme)*	16 (3)	18 (9)
Accurate reporters	4	3
Over-reporters (extreme)*	7 (3)	5 (0)
Home food inventory		
Under-reporters	6	14
Accurate reporters	3	1
Over-reporters	18	11

*Extreme misreporting was defined as a deviation of 2.27 kg or more from a participant's actual body weight.

study for lean individuals and for the Larson study were the same.

In the present study, mean BMI among individuals with obesity was $35.4 \pm 4.80 \text{ kg m}^{-2}$. Both the direction and magnitude of the correlation (+0.48; lower social desirability scores associated with a greater degree of under-reporting) among individuals in this group was unexpected, not only because of the correlations found in previous studies with energy intake (20–27) but also particularly so because previous studies had also found (as was found here) that the extent of under-reporting energy intake was greater with increasing BMI (5,8,25,30–33). The present results cannot be due to the assessment tool for measuring social desirability as most previous studies also used the Marlowe–Crowne scale (20–22,24–27,37,38). Previous studies reported that the strength of the relationship between social desirability and misreporting energy intake and body weight was stronger in women than men (12,20,38) and that results were also influenced by level of education (21,35). However, in the present study, the two samples did not differ in terms of education and were very similar with regard to age, gender and ethnicity. While many studies have found an association between under-reporting of energy intake and both BMI (5,8,25,30–33) and social desirability (20–27), there is little evidence to support a relationship between BMI and social desirability. One study reported a correlation of -0.21 (23) and another reported $+0.18$ (22). No study has reported an overall statistically significant difference in social desirability between lean individuals and individuals with obesity. In the present study, the mean Marlowe–Crowne scores for the two groups (17.7 ± 4.2 for lean individuals and 15.4 ± 5.3 for individuals with obesity) did not significantly differ, and the range of scores was very similar.

Researchers have assumed that on self-reports, individuals high in social desirability may 'overestimate desirable traits and behaviors and underestimate undesirable ones' (23) or 'provide answers believed to be socially accepted' (37). Factor analysis has revealed that misreporting because of high social desirability can result from two factors: (i) self-deception, i.e. the respondent truly believes his or her self-reports because he or she has an overly positive impression of himself or herself or (ii) impression management, i.e. the respondent deliberately over-reports or under-reports in order to deceive others (29). In a review of studies of self-reported body weight, Polivy *et al.* (16) concluded that women who were overweight under-reported their body weight primarily because of the former, i.e. that they truly believed themselves to be thinner than they actually were. However, neither self-deception nor impression management is helpful in explaining the present results found for

individuals with obesity. The magnitude of the positive correlation between misreporting of body weight and social desirability was due largely to eight of the nine extreme under-reporters having social desirability scores in the lower half of the Marlowe–Crowne scale.

For energy intake, the implicit assumption has always been that the socially desirable goal is to eat less. If true, then a related socially desirable goal would be not to gain excess weight, and a reasonable conclusion is that individuals high in social desirability would weigh themselves somewhat regularly and have a good idea of their body weight. Conversely, individuals low in social desirability may not have weighed themselves for a considerable time and have little idea of how much weight they have gained. The research team members noted that most of the individuals with obesity were reluctant to have team members weigh them during the home visit. It should also be noted that at the time of the home visit, two individuals with obesity revealed that they had recently begun to diet. Both had social desirability scores in the upper half of the Marlowe–Crowne scale (scores of 19 and 24), and both gave accurate self-reported body weights.

Conclusion

Individuals with obesity are more likely than others to be extreme under-reporters of body weight. We concur with Brestoff *et al.* (39) and Burke and Carman (9) that this is likely due to these individuals being unaware of their body weight. In their examination of the National Health and Nutrition Examination Survey data, Burke and Carman (9) concluded that 41% of the female respondents and over 50% of the male respondents were 'weight unaware'. The present results suggest that among individuals with obesity, the lack of awareness is often the result of relatively low social desirability.

Conflict of Interest Statement

The authors declared no conflict of interest.

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