


Body size perception and ideal body size in overweight and obese young adult women

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Abstract

Purpose The purpose of this study was to examine the differences among actual body size, perceived body size, and ideal body size in overweight and obese young adult women.

Methods Actual body size was assessed by body mass index (BMI), while self-perceived and ideal body sizes were assessed by the Body image assessment tool-body dimension. Descriptive statistics were calculated and analysis of variance (ANOVA) was performed on actual BMI as a function of perceived BMI.

Results Of the 42 participants included in the study, 12 were overweight ($25 \leq \text{BMI} < 30$), 18 were obese 1 ($30 \leq \text{BMI} < 35$), and 12 were obese 2 ($35 \leq \text{BMI} \leq 39.48$). The mean ideal body size of participants was 25.34 ± 1.33 . Participants in general perceived their body size (BMI: 35.82 ± 1.06) to be higher than their actual body size (32.84 ± 0.95). Overweight participants had a significantly higher mean body size misperception than obese 2 individuals ($\mu_{\text{dif}} = -6.68, p < .001$).

Conclusion Perception accuracy of body size differs in women by BMI. Weight loss programs need to be tailored to consider body size misperception in order to improve treatment outcomes for overweight and obese young women.

Keywords Body image · Body size perception · Young adults · Overweight · Obese · Women

Background

Body image is described as how a person thinks or feels about their body [1]. During the transition to young adulthood, negative body image is dramatically increasing for overweight and obese young adults [2]. Two important factors related to negative body image are body dissatisfaction and misperception of size [1]. Body dissatisfaction is when someone dislikes his or her body and desires it to be different [1], while body size misperception occurs when individuals cannot correctly recognize their body size [3]. These body image concerns are becoming increasingly common among overweight and obese individuals [4, 5].

Age, gender, race, and degree of obesity play major roles in the development and maintenance of body dissatisfaction and misperception of body size [6–8]. For example, females report more body dissatisfaction than males [8, 9] and overweight and obese individuals become increasingly dissatisfied with their body sizes as their body mass index (BMI) increases [8]. Whether body misperception differs by weight is unclear. Studies have found that overweight and obese individuals are more likely to misperceive their body size than normal weight individuals [5, 6]. Conversely, another study showed that as BMI increases, overweight and obese individuals become more

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accurate in their perception of their body size [7]. These conflicting results make it difficult to assess the true nature of the relationship between body misperception and BMI.

Body dissatisfaction and misperception can lead to a variety of health problems for overweight and obese individuals, especially young adults. Lower body satisfaction is correlated with unhealthy behaviors like binge eating, smoking, weight gain, and reduced physical activity [1, 10–12]. Depression, low self-esteem, and development of an eating disorder are also associated with body dissatisfaction [12–14]. Like body dissatisfaction, both types of body size misperception (i.e., over and under assessing one's body size) are harmful. Previous literature suggests that the underassessment of an individual's weight may contribute to reduced motivations to lose weight and the belief that being overweight or obese is not a health risk [4, 15]. In contrast, overweight and obese young adults who over assess their weight status are at an increased risk to practice unhealthy dieting habits [16].

There are many weight loss programs available to individuals. The majority of these programs target overweight and obese individuals together with the focus of weight loss based on the actual body size. One study has found that individuals who under-reported their weight had better weight loss outcomes [17]. However, most programs do not consider how body image issues (e.g., body dissatisfaction, body size misperception) in overweight and obese young women may influence the success of the program.

This study focuses on overweight and obese young women's perception of their own bodies, and attempts to broaden our understanding of the roles body dissatisfaction and size misperception play in these perceptions. More precisely, it aims to understand the association between overweight or obese young women's actual BMI and their ideal and perceived body size.

Methods

Recruitment and eligibility criteria

Participants were recruited from the greater Atlanta area as part of a larger diabetes prevention study after approval from the Emory University Institutional Review Board [18]. Recruitment flyers were distributed at eight universities as well as in the waiting rooms of local diabetes clinics. eRecruitment flyers were also emailed to all students at one university. Additionally, participants were recruited by self-referral through individuals who had already volunteered to participate. Participants were excluded from the study if they were pregnant or following a physician supervised exercise or diet regimen. The parent

study recruited 107 males and females who were between the ages of 18–29, overweight (BMI 25–29) or obese (BMI \geq 30), and exercised less than 90 min per week [19]. In this sub-study, we focused on young women, who are more vulnerable to body image issues and eating disorder than young men or older women [20, 21]. Further, individuals with a BMI of higher than 39.5 were excluded due to the limitations of the body image assessment tool-body dimension (BIAS-BD) (see more details in the measurement section). Forty-four young women with a BMI range of 26.79–38.76 met these criteria for inclusion in the present analysis. Of this new cohort, one participant was excluded because she did not provide an ideal or perceived BMI. Another participant was excluded because it appeared as though she did not take the questionnaire seriously; her perceived BMI was the lowest reported (5.64 points lower than the second-lowest reported score) and her ideal BMI was the largest reported (4.23 points higher than the next highest reported score). Thus, 42 overweight and obese young women met all eligibility criteria and were included in the subsequent analyses.

Variables and measures

A research nurse at hospitals in the greater Atlanta area recorded height and weight during a diabetes screening test conducted for the parent study. BMI was subsequently calculated as weight (kg) divided by height squared (m^2).

The BIAS-BD was used to assess the perceived body size and the ideal body size of each participant. This tool has high validity among young adults [22] and asks participants to select from a contour body figure drawing of 17 female figures, presented in random order, which corresponded to BMIs ranging from 16.92 to 39.48 [22]. Participants were asked to identify two figures: one that matched their current body size and one that represented their ideal body size.

Data analysis

Data were analyzed using the software program IBM SPSS 20.0. Participants were stratified into three groups: overweight ($25 \leq$ BMI $<$ 30), obese 1 ($30 \leq$ BMI $<$ 35), and obese 2 ($35 \leq$ BMI \leq 39.48). Body size perception accuracy of weight status was calculated by subtracting perceived BMI from actual BMI. A negative value indicated that the participant perceived herself to be larger than she was, while a positive value indicated that she perceived herself to be smaller than she actually was. To assess body size perception accuracy between groups, a one-way analysis of variance (ANOVA) test was conducted. The assumption of normality was met via 95 %

confidence intervals of skew and kurtosis. The assumption of homogeneity of variance, however, was violated, evidenced by a significant Brown–Forsythe test of homogeneity, $F(2,39) = 10.14$, $p < .001$, $\omega^2 = .30$. Independent single-df contrast tests and Tamhane post hoc tests assuming non-equal variances were used to address the issue of heterogeneous variance. A second ANOVA was conducted to test for differences in ideal BMI among the different body size categories, to determine if the prospective differences in the first ANOVA were rooted in a greater desire to be thinner in one group compared to the others. Two participants were excluded from this analysis because they did not complete this section of the questionnaire. The assumption of normality was also met here using the same aforementioned procedure. The assumption of homogeneity of variance was met, evidenced by a non-significant, very small effect Brown–Forsythe test of homogeneity, $F(2,37) = .12$, $p = .89$, $\omega^2 = -.05$.

Results

Socio-demographics

On average, participants had a BMI of 23.85 ± 1.04 . Their average age was 23.85 ± 1.04 . The majority of participants were African American (63.6%). The rest of the participants were White (25.0%) or identified as “other” (11.3%). Women generally perceived themselves to be obese and identified themselves as having a BMI almost three points higher than actual size (average perceived BMI of 35.82 ± 1.06). The average ideal body size was a BMI of 25.35 ± 1.33 .

Accuracy of body size perception

There was a statistically significant difference between actual BMI, regardless of the obesity category designation, and perceived BMI [$\mu = -2.98$, 95% CI ($-4.15, -1.81$)]. In particular, perception accuracy was significantly different between overweight and obese two groups with a large effect size, $t(15.92) = -6.68$, $p < .001$, Cohen’s $d = 2.06$ (see Tables 1, 2). Body size perception accuracy was also significantly different between obese 1 and obese 2 groups showing a large effect size, $t(26.31) = -4.08$, $p < .001$, Cohen’s $d = 1.81$. However, overweight and obese 1 groups showed no statistically significant difference in perception accuracy, $t(15.89) = -1.93$, $p = .07$, Cohen’s $d = .76$. The medium-large effect size of this test elicited a post hoc power analysis, resulting in weak power, $(1 - \beta) = .50$.

Table 1 One-Way ANOVA results and descriptive statistics for perception accuracy of body image by actual body mass index category

BMI category ^a	Perception accuracy of body image				
	<i>n</i>	Observed mean	SD		
Overweight	12	−6.01			4.23
Obese 1	18	−3.41			2.43
Obese 2	12	0.67			2.06
Source	<i>df</i>	MS	<i>F</i>	ω^2	$1 - \beta$
BMI category	2	136.76	15.51*	.41	1.00
Error	39	8.82			

The assumption of homogeneity of variance has been violated, evidenced by a significant Brown–Forsythe test of homogeneity, $F(2,39) = 10.14$, $p < .001$, $\omega^2 = .30$. Independent single-df tests assuming non-equal variances show significant differences between three groups

* indicates significance at $\alpha = .001$

^a Overweight: $25 \leq \text{BMI} < 30$, Obese 1: $30 \leq \text{BMI} < 35$, Obese 2: $35 \leq \text{BMI} \leq 39.48$

Ideal body size by weight status

Another one-way ANOVA was employed to test if the observed differences in body size perception accuracy were due to an increased desire among overweight and obese 1 women to be thinner as compared to obese 2 women. The means of the reported ideal BMI for each group were not significantly different across the three weight categories, $F(2,37) = .70$, $p = .50$, $\omega^2 = -.01$ (See Table 3). That is, the differences in body size perception accuracy found between groups may not be affected by the women’s ideal body size desire.

Discussion

In alignment with previous research [6, 9, 21], the findings of the study showed that young women tend to overestimate their BMIs. However, body size perception accuracy was different across obesity categories; obese women with a BMI of 35–39.48 more accurately perceived their own body size than women with BMIs of 25–34.99, as Paul and colleagues addressed [5]. This difference may also be occurring between overweight women (BMI of 25–29.99) and obese women with a BMI of 30–34.99 (obese 1), indicated by a non-significant, but medium-large effect. As Docteur et al. addressed, as BMI status increased individuals often acknowledged their body size [6]. For these individuals, it may be difficult to overlook or avoid their

Table 2 Multiple Comparisons and Mean Differences in perception accuracy of body image by actual body mass index category

BMI category comparison ^a	Difference	SE	Independent single-df test			Tamhane test CI
			df	t	Effect size (d)	
Overweight versus obese 1	−2.60	1.35	15.89	−1.93	0.76	−6.20, 0.99
Overweight versus obese 2	−6.68*	1.36	15.92	−4.92	2.01	−10.30, −3.06
Obese 1 versus obese 2	−4.08*	0.83	26.31	−4.94	1.81	−6.18, −1.97

Independent single-df tests assumed non-equal variances. Tamhane *post hoc* tests were conducted using 95 % confidence intervals for means

* indicates significance at $\alpha = .001$

^a Overweight: $25 \leq \text{BMI} < 30$, obese 1: $30 \leq \text{BMI} < 35$, obese 2: $35 \leq \text{BMI} \leq 39.48$

Table 3 One-way ANOVA results and descriptive statistics for ideal body mass index by actual body mass index category

BMI category ^a	Ideal body mass index			ω^2	$1 - \beta$
	n	Observed mean	SD		
Overweight	12	24.32	4.50		
Obese 1	16	26.26	4.08		
Obese 2 and 3	12	25.15	4.49		
Source	df	MS	F	ω^2	$1 - \beta$
BMI category	2	13.23	0.70	−0.01	–
Error	37	18.79			

^a Overweight: $25 \leq \text{BMI} < 30$, Obese 1: $30 \leq \text{BMI} < 35$, Obese 2: $35 \leq \text{BMI} \leq 39.48$

weight status. Consequently, they are less likely to misperceive their body size.

In this study, overweight women generally misperceived their weight status more than obese women. This overestimation of actual body size by overweight women may have implications for future weight loss programs, since body satisfaction often causes psychological, social, self-esteem, and diet issues [9, 16, 20, 23, 24]. If a weight loss program only emphasizes weight reduction without considering body size misperception and body size inaccuracy, it may produce a negative body image that increases unhealthy weight loss behaviors (e.g., binge eating) [1]. Thus, programs should emphasize awareness of one's body size and the acceptance of the body size. An individualized weight loss program emphasizing body size perception accuracy in addition to healthy eating and exercise may provide additional psychological and physical benefits for overweight women. Conversely, obese women, in particular those who have BMIs greater than 35, may require additional education to maintain body satisfaction during weight loss, as their body perception accuracy is more realistic. For obese young women, a weight loss program may incorporate self-esteem training to increase body satisfaction to maintain a positive self-image throughout the weight loss process. A tailored program would be

beneficial in encouraging women to set and reach a realistic body size goal, rather than ending a weight loss plan early or continuing beyond the original target body size due to body size misperception or dissatisfaction. Providing appropriate messaging based on differences in the accuracy of body size perception should help increase the overall efficacy of a weight loss program.

There was no difference in the ideal body size of overweight and obese 1 women as compared to obese 2 women in the current study, despite their actual body size differences and major differences in body size perception accuracy. While Paul and colleagues reported that the majority of overweight and obese adults chose normal weight as their ideal body size, our participants, on average, indicated that their ideal body size was slightly overweight (mean ideal BMI of 25.3) [5]. Geographical and racial factors (i.e., New York vs. Atlanta) may have contributed to these differences. Further investigation is necessary to discern how these differences are generated.

While the findings provide potential considerations for the development of weight loss programs depending on one's actual body size, there are a few limitations of the current study. A small sample size restricted the generalizability of the findings. Replication of this study with a larger sample size may further clarify whether a true difference between overweight and obese 1 groups on body size perception accuracy exists. Further, and also due to the low sample size, we were unable to examine whether there were differences in body size misperception or ideal body size by race/ethnicity, which remains a primary area for further research in this field.

The instrument used in this study, the BIAS-BD, also provides limitations in some regards. The figures depicted in the questionnaire only went up to a BMI of 39.48 and the authors excluded a number of participants (BMI > 39.48) who took part in the parent diabetes screening study [22]. Excluding this group from the study could have affected the analysis of body size misperception, in particular leading to a ceiling effect in the obese 2 group. In addition, the exclusion of obesity 3 participants (BMI > 39.48), led to smaller numbers of participants and groups. To more accurately represent the true distribution of BMI in

Americans, the revision of the BIAS-BD tool should be considered in order to better examine body size misperception among all obese individuals.

Conclusions

The current study identifies body size misperception as a prevalent potential confounder in one's understanding of their health status, with implications for overweight and obese young women's adherence to weight loss treatment plans. Clinicians should be aware of this impact and address body size accuracy and perception as a part of a weight loss program. Incorporating healthy body image support into a weight loss treatment plan could facilitate more accurate recognition of weight status. This plan could reinforce a healthy body image when setting initial weight loss goals, as well as provide better support for continued weight loss and the maintenance of achieved target weight. Since the accuracy of a woman's body size perception can have a substantial impact on her physical and mental health, body size perception needs to be considered whenever the health of an overweight or obese young adult woman is discussed [1, 11, 20].

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Compliance with Ethical standards

Conflict of interest We have no potential conflict of interest.

Ethical approval This study was approved by the Emory University Institutional Review Board in Atlanta, Georgia.

Informed consent Informed consent was obtained from all participants in the study.

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