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Prospective Changes in Body Image Dissatisfaction among Adolescent Bariatric Patients: The Importance of Body Size Estimation

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Abstract

Background—Body image dissatisfaction (BID) is pervasive among patients presenting for bariatric surgery but significantly improves post-operatively. These findings are based primarily on studies of adults.

Objective—The objective of this study was to examine changes in BID among adolescents with extreme obesity from baseline/preoperative to 6 and 12 months following bariatric surgery using body size estimation.

Setting—Pediatric Medical Center.

Methods—BID was prospectively assessed among 16 adolescent bariatric patients ($M_{\text{age}}=16.3 \pm 1.2$, $M_{\text{BMI}}=66.2 \pm 12.0$, 67% female) using a standard visual/perceptual measure [i.e., Stunkard Figure Rating Scale. Participants identified Current and Ideal body size, with a discrepancy score (Current – Ideal) indicating BID. Body size estimation ratings were compared to attitudinal (i.e., IWQOL-Kids: Body Esteem and Self-Perception Profile for Adolescents: Physical Appearance) body image scores, BMI (kg/m^2), and Total weight-related quality of life (WRQOL).

Results—There was a significant reduction in Current body size (7.9 to 6.4, $p < .001$) from baseline to 6 months but not from 6 to 12 months. Current body size was related to BMI and %EWL but not attitudinal body image at each time point. Smaller Discrepancy (Current – Ideal) was associated with higher Total WRQOL ($r = -0.68$), with a trend towards significance for Body Esteem ($r = -0.65$) at 12 months.

Conclusions—Adolescents undergoing bariatric surgery experience significantly decreased BID within the first 12 months post-surgery, with the most substantial change between baseline and 6 months. Post-operative WRQOL is more closely associated to body size discrepancy than current body size.

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Keywords

Adolescent; Bariatric; Body Image; Weight-related Quality of Life

Introduction

Body image dissatisfaction (BID) is among the most pervasive psychological issues that bariatric patients' present with prior to bariatric surgery⁽¹⁾. Although accumulating data suggests that adult bariatric patients report significantly reduced BID following surgery^(2–5), these findings are based on attitudinal, affective, and/or cognitive components of body image (i.e., attitudes and beliefs about an individual's body/appearance). There is also a perceptual component of body image that assesses the accuracy of individuals' assessment of their body/weight/shape. This body size estimation is often assessed using schematic figure rating scales⁽⁶⁾. Figure rating scales are comprised of a range of silhouettes incrementally increasing in size from very thin to very obese. Ordinal scores are derived from individual's selection of the figure they believe represents how they currently look, as well as the figure they would like to look like⁽⁷⁾. Accuracy of body size perception is related to a number of important outcomes including eating pathology⁽⁶⁾ and long-term weight management among adults⁽⁸⁾.

Although figure rating scales have been used to measure accuracy of judgment between perceived and actual body size using BMI-normed scales^(9,10) their use has also been recommended for assessing BID by calculating the discrepancy between Current and Ideal ratings⁽⁷⁾. The larger the discrepancy between Current and Ideal ratings, the greater the BID an individual is thought to experience. To date, only one cross-sectional study has used figure rating scales to assess BID with bariatric patients^(11_ENREF_8). This study, conducted among a small sample of adult Roux-en-Y gastric bypass patients who ranged from pre-surgery to 1 year post-surgery, revealed a significant decrease in BID, primarily occurring between pre-surgery and 6 months post-surgery.

Reductions in BID have been associated with concurrent reductions in weight loss and improvements in weight related quality of life (WRQOL) among adult gastric bypass surgery patients up to 92 weeks post-surgery⁽⁴⁾. Interestingly, although several studies suggest greater percentage of excess weight loss is associated with greater reduction in BID^(3,4), not all studies show the same association^(2,12). Preliminary evidence among obese youth also suggests reduced BID following substantial weight loss through both non-surgical⁽¹³⁾ and surgical⁽¹⁴⁾ interventions. Evidence of simultaneous post-operative improvement in measures of BID and WRQOL among obese youth has already been documented by the senior author (MHZ) but, similar to the adult data, these findings are based on commonly used attitudinal measures (e.g., Impact of Weight on Quality of Life – Body Esteem subscale). The relationship between perceptual and attitudinal measures of BID and other psychological outcomes (e.g., anxiety, depression) among adolescents has been established⁽¹⁵⁾, but longitudinal examination of all these variables among adolescents experiencing substantial dramatic weight loss remains a void in the literature.

Consistent with the adult literature^(11,12), we hypothesize a quadratic effect for reduction in postoperative body size estimation, with the most substantial decrease occurring between baseline and 6 months and a smaller decrease occurring between 6 and 12 months. Also consistent with the literature⁽³⁾, we hypothesize that Current body size estimation and decrease in discrepancy between Current and Ideal body size will be associated with improvement in attitudinal body image and Total weight-related quality of life (WRQOL) at 6 and 12 months.

Methods and Participants

The present investigation utilized data from a prospective, longitudinal study observing the psychosocial adjustment of adolescents undergoing Roux en Y Gastric Bypass (RYGB) surgery at a large Midwestern pediatric hospital. This study was approved by the hospital Institutional Review Board.

Participants and Procedures

Adolescents with a BMI ≥ 40 kg/m² were referred for an intake evaluation in a hospital-based bariatric program for teens. RYGB candidacy was based on adolescent patient selection guidelines previously described^(16, ENREF_13). Study inclusion criteria required that adolescents received clinical and insurance approval for RYGB, were 13–17 years of age, and had no physical impairments unrelated to obesity or developmental disability. Participants were informed that their consent/assent included access to medical information related to their care in the bariatric program. Trained staff provided questionnaire packets to participants in private clinic space and were available for assistance as needed. All study visits were scheduled with clinical visits for patient convenience. Participants who were unable to attend research visits at 6 and 12 months were given the option to complete and return questionnaires sent via Federal Express.

Of the 17 eligible consecutive patients meeting inclusion criteria, 16 (94%) adolescents agreed to participate. Retention was high, with data obtained at all time points for 88% of the sample. Missing data was addressed by carrying the last obtained observation forward. This approach was selected over imputation given the small sample size and variability in responses between participants. Eligible bariatric candidates underwent surgery between July 2005 and January 2007. Participants were compensated for participation in the study.

Consistent with demographics of those seeking adolescent bariatric surgery at the medical institution^(14,17), the majority of participants were White (75%) and female (69%) with an average age of 16.3 (± 1.2) years. The average baseline BMI was 66.2 ± 12.0 , with no significant gender differences.

Measures

Perceptual Measure

The Stunkard Figure Rating Scale⁽¹⁸⁾—This instrument assesses Current and Ideal body size estimation using a series of 9 gender-specific silhouettes increasing in body size. Each silhouette was labeled from A to I for administration then converted to a corresponding numerical score (1–9), with higher numbers indicating larger body size. Participants were instructed, “Below are some drawings of (fe)male figures of the same height, but different weight or shape. Please circle the letter below the figure that indicates (a) Which figure looks the most like you currently/today (i.e., Current)?, (b) Which figure would you most like to look like (i.e., Ideal)?” A discrepancy score indicating BID was calculated for each time point by subtracting the Ideal figure (b) from the Current (a) figure. As suggested in the literature, lower discrepancy scores were interpreted as less BID. Reliability and validity of this scale has been established⁽¹⁹⁾.

Cognitive Measures

Impact of Weight on Quality Of Life –Kids(IWQOL-Kids)⁽²⁰⁾—This 27-item instrument evaluates WRQOL for adolescents aged ≥ 11 years. It is comprised of four subscales (Physical Comfort, Body Esteem, Social Life, and Family Life), and a Total score. Response options ranged from always true (1) to never true (5). The score on each subscale

was calculated as an unweighted sum of that scale's constituent items and then transformed to 0 to 100 scoring, where 100 represents the best quality of life. Internal consistency coefficients are sufficient, ranging from 0.88 to 0.95 for scales and equaling 0.96 for Total score. For this study, we utilized the Body Esteem score (9 items), which reflects adolescents' preoccupation with weight and appearance and how they feel about their body, as well as the Total score. Psychometric properties are excellent, with internal consistency scores of 0.95 and 0.96 in the published literature and 0.91 and 0.94 in this study, respectively⁽²⁰⁾.

Self-Perception Profile for Adolescents (SPPA)⁽²¹⁾—This 36-item instrument evaluates adolescent's perceptions of their competencies in six areas: Scholastic Competence, Social Acceptance, Athletic Competence, Physical Appearance, Behavioral Conduct, and Global Self-worth. Higher scores indicate higher perceived competence. For the purposes of this study, only the Physical Appearance subscale was used. Subscale reliability ranges from .74 to .92 in the published literature⁽²¹⁾. Internal consistency in this sample was acceptable (0.88).

Anthropometrics

Adolescent weight and height—Body weight was recorded using a digital scale (Model 5002 Stand-On Scale, Scale Tronix, Inc., White Plains, New York). Height was measured using a calibrated wall-mounted stadiometer (Ayrton Stadiometer Model 5100, Ayrton Corporation, Prior Lake, Minnesota). Adolescents were weighed and measured in light clothing and without shoes. These data were used to calculate Body Mass Index (BMI: kg/m^2). Percent excess weight loss (%EWL) at 12-months was also calculated using the following formula. Each participants' baseline ideal body weight ($\text{IBW} = \text{height}^2 \times \text{BMI}$ at the 85th percentile for sex and age) and baseline excess weight ($\text{EW} = \text{Baseline weight} - \text{IBW}$) were calculated. %EWL is defined as an adolescents' weight lost at 12-months divided by $\text{EW} \times 100$.

Data Analysis

Descriptive statistics were calculated to characterize demographic and anthropometric variables. Mean change in body size estimation over time (i.e., baseline, 6 month, and 12 month) was examined with a series of repeated measures ANOVAs using a totally within-subjects design. When overall differences were detected, post hoc tests of all pairwise comparisons with a Bonferroni correction for multiple comparisons were performed to determine at which time points significant differences occurred. Significance was determined when $p < 0.005$. Pearson correlation coefficients were calculated to determine significant relationships between body size estimation (Current, Ideal, Discrepancy) and body image measures (i.e., IWQOL – Body Esteem and SPPA – Physical Appearance) and WRQOL - Total within and between each time point. Power analyses conducted using G*Power 3.1.3 indicated 60% power to detect a large (i.e., 0.8) effect size with a sample size of 16^{(22)_ENREF_18}. Data were analyzed using IBM SPSS Statistics 19.

Results

A repeated measures ANOVA with a Greenhouse-Geisser correction revealed a significant change in Current body size estimation over time ($F(2, 24) = 44.19, p < 0.001$). Post hoc tests using the Bonferroni correction revealed a significant decrease in Current body size estimation from baseline to 6 months postoperative ($p < .001$), but with no difference between 6 and 12 months (see Table 1). As hypothesized, there was a quadratic effect with the most substantial reduction in Current body size estimation (i.e., from larger to smaller) occurring during the first 6 months post-surgery. Participants maintained their Ideal body

size estimation rating, with no significant change over time ($F(2, 24) = 0.81, N.S.$). Discrepancy between Current and Ideal body size estimation differed significantly between time points ($F(2, 24) = 33.31, p < 0.001$), with a significant decrease between baseline and 6 months postoperative ($p < .001$) but with no difference between 6 and 12 months. Current body size estimation was significantly correlated with BMI at baseline ($r = 0.76, p < .005$), 6 months ($r = 0.81, p < .001$) and 12 months ($r = 0.88, p < .001$) and with %EWL at 6 months ($r = -0.76, p < .001$) and 12 months ($r = -0.69, p < .005$). The average BMI at 6 months was 45.8 ± 9.9 (%EWL 51.0 ± 9.4) and the average BMI at 12 months was 41.1 ± 9.6 9 (%EWL 61.7 ± 11.7).

Contrary to initial hypothesis, Current body size estimation at baseline, 6, and 12 months was not related to attitudinal body image variables (i.e., IWQOL – Body Esteem and SPPA – Physical Appearance) or WRQOL at any of the corresponding time points. There was also no significant associations between time points (e.g., between baseline body size estimation and 12 month WRQOL). Body size estimation Discrepancy Score, however, was negatively correlated with Total WRQOL ($r = -0.68, p < .005$), with a trend towards significance for Body Esteem ($r = -0.65, p < .008$) at 12 months. This suggests that the smaller the difference between Current and Ideal body size estimation, the higher the Total HRQOL adolescents may experience. There was no association between body size estimation Discrepancy and %EWL at 6 or 12 months. %EWL was not significantly correlated with attitudinal body image variables (i.e., IWQOL – Body Esteem and SPPA – Physical Appearance) or WRQOL at 6 or 12 months. Please see Zeller et al (2010) for results related to other body image and WRQOL measures.

Discussion

This study fills a gap in the literature by providing an initial look at changes in BID among adolescent bariatric patients from baseline to 12 months post-surgery. These findings help further our understanding of the association between BID and important post-operative outcomes such as WRQOL. As hypothesized, adolescent bariatric patients reported significantly reduced BID (as indicated by a decrease in the discrepancy between Current and Ideal figure rating scale ratings) within the first 12 months post-surgery, with the most substantial reduction occurring within the first 6 months. Improvement in body image is important inasmuch as it is closely linked to increase in self-esteem, which is in turn associated with improved adolescent psychological functioning^(23,24) ENREF_20 and decreased engagement in high-risk behaviors⁽²⁴⁾. The use of figure rating scales to assess changes in body image may be particularly salient for bariatric surgery patients who often present for surgery with high levels of BID and who subsequently lose large amounts of weight in a relatively short period.

A key finding in this study was the lack of association between Current body size estimation and attitudinal body image measures or overall WRQOL. The only weight/shape factor related to attitudinal BID and WRQOL at 12 months was discrepancy between Current and Ideal body size. Thus, the size adolescent bariatric patients perceive themselves to be (i.e., perceived Current) may contribute less to how they feel about themselves than how closely they come to meeting their body size ideal. These findings are consistent with the adult literature, whereby even modest weight loss has been associated with significant body image improvement among treatment-seeking obese adults, regardless of end BMI or total weight loss^(25,26). Although none of the adolescent bariatric patients reached their Ideal body size by 12 months post-surgery, the decrease in the discrepancy between how they perceived themselves to look and how they would like to look may have been enough to impact their WRQOL. Future studies should assess this relationship using a larger sample.

Although the purpose of this paper was not to look at accuracy of adolescent bariatric patients' body size estimation and their actual BMI, the relationship between these variables is nonetheless important as it relates to weight perception. Adolescent Current body size estimation was significantly related to BMI at all time-points ($r=.76-.88$). However, the strength of the relationship between BMI and Current body size estimation was notably lower than that among a large sample of weight-heterogeneous adults ($r=.97-.98$) (⁹_ENREF_24). Based on the FRS BMI norms established by Bulik et al (2001), adolescents in this study were more likely to report smaller body size estimation in relation to their actual weight at every time point. The average BMI corresponding to figures selected by participants at 12 months post-surgery are as follows: 29.9 (Figure 3), 34.6 (Figure 4), 41.4 (Figure 5), 43.6 (Figure 6), 54.9 (Figure 7), and 64.7. The extent to which distortion occurs between actual weight and body size estimation among bariatric surgery patients merits further research, as does, the relationship between weight and BID. Despite substantial weight loss, the majority of the adolescent bariatric patients in this study remained extremely obese at 12 months post-surgery. The improvement in participants' body image (as indicated by a decrease in the discrepancy between Current and Ideal body size) reported in this study is consistent with other research that suggests that BID mediates the relationship between overweight and emotional well-being among adolescents⁽²⁷⁾. These findings challenge the assumption of a linear relationship between BID and BMI that has been suggested among community-based samples of children and adolescents⁽²⁸⁾_ENREF_26).

This study has a number of limitations. First, body size estimation and BMI are highly correlated, making it difficult to ascertain the impact of actual versus perceived weight on BID and WRQOL. Future studies with larger samples and more sophisticated data analytic techniques should examine this relationship in more detail. The sample size, though small, is comparable to other published studies of adolescent bariatric patients. A larger sample would permit more rigorous examination of relationships between variables and may reveal significant findings not detected in this study. The sample is also comprised of a somewhat homogenous group. Although representative of the adolescent bariatric patients at this institution, it will be important to replicate this study with a more racially diverse and gender balanced cohort. This will allow for better assessment of cultural variability in body image and "ideal" body size and shape perceptions that has been well-documented in the literature^(13,23). Finally, although the Stunkard figure rating scale is the most widely used body size estimation scale in the literature, the figures have been criticized for lack of precise size progression between figures²⁹ and may have less face validity among younger individuals and those from different racial/ethnic backgrounds⁽³⁰⁾_ENREF_28). This scale was selected for use in this study given the older age of participants ($M=16.3$ years) and relatively homogenous make-up of the study population, but different figure rating scales may be beneficial in future studies.

Conclusions

Adolescents undergoing bariatric surgery experience significant reductions in BID within the first 12 months post-surgery, most substantially within the first 6 months, as indicated by their Current and Ideal body size estimation. The size adolescent bariatric patients perceive themselves to be (i.e., perceived Current body size estimation) may contribute less to how they feel about themselves at one-year post-operatively than how closely they come to meeting their body size Ideal. Assessment of body size estimation among adolescent bariatric patients yields valuable clinical information above and beyond attitudinal measures of BID.

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Table 1

Mean and Standard Deviation of Weight (i.e., BMI, Percent Excess Weight Loss [%EWL]), Perceptual Body Image (i.e., Body Size Estimation [BSE; Current, Ideal, and Discrepancy]), Cognitive Body Image (i.e., Physical Appearance, Body Esteem subscales) and HRQOL Scores for Bariatric Patients at Baseline, 6, and 12-Months

	Baseline	6 Month	12 Month
BMI	66.83±12.13 ^a	46.36±9.99 ^b	41.11±9.62 ^c
%EWL	-----	51.0±9.4 ^a	61.7±11.7 ^b
BSE – Current *	7.93±1.1 ^a	6.44±1.2 ^b	5.93±1.4 ^b
BSE – Ideal *	3.79±1.1 ^a	3.94±0.9 ^a	3.80±1.3 ^a
BSE – Discrepancy †	4.14±1.2 ^a	2.50±1.3 ^b	2.13±1.4 ^b
Physical Appearance ‡	1.99±0.7 ^a	2.45±0.8 ^{a,b}	2.81±0.8 ^b
Body Esteem ‡	51.22±26.8 ^a	72.12±23.1 ^b	77.86±24.3 ^b
Total HRQOL ‡	63.49±17.1 ^a	83.20±12.1 ^b	89.51±9.2 ^b

* BSE scores range from 1–9 with higher numbers indicating larger perceived body size.

† BSE Discrepancy score derived from Current BSE score minus Ideal BSE score, with higher number indicating larger discrepancy and more BID

‡ Higher scores indicate better perceived competence or self-evaluation of construct specified Values with same superscript letter were not different from one another; values without same letter were significant according to Bonferroni adjustment; significantly different at $p < .005$.