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The Role of Body Appreciation, Weight Bias Internalization, and Disordered Eating Behaviors among Pre-Surgical Bariatric Patients

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Abstract

Background: Body appreciation and internalized weight bias have consistently been associated with eating behaviors. However, research has yet to examine the role of these variables among pre-surgical bariatric patients.

Objectives: The present study sought to assess the relationships between body appreciation and weight bias internalization, binge eating, disinhibited eating, and symptoms of depression and anxiety among a sample of pre-surgical bariatric patients. The study also sought to examine the extent to which body appreciation and weight bias internalization account for unique variance in disordered eating even when controlling for depression and anxiety.

Setting: Academic medical center in the United States.

Methods: Data were collected on body appreciation, weight bias internalization, eating behaviors, depression, and anxiety as part of a standard pre-surgical psychological evaluation for bariatric surgery ($N = 319$). Pearson correlations were used to assess relationships between all study variables. Multiple regressions were conducted to assess the role of body appreciation and weight bias internalization on disordered eating.

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Results: Significant associations were found between low levels of body appreciation and high levels of weight bias internalization, disordered eating, and symptoms of depression and anxiety. Results indicated that body appreciation and weight bias internalization each significantly accounted for unique variance in symptoms of binge eating and disinhibited eating. Depressive symptoms were also statistically significant in all analyses.

Conclusions: Findings indicate the importance of conducting future positive body image research, as well as continuing to examine weight-related constructs, such as internalized weight bias, among bariatric surgery patients.

Keywords

Body appreciation; positive body image; weight bias internalization; binge eating; bariatric surgery

1. Introduction

The field of bariatric surgery has recognized the importance of studying the complex and multidimensional construct of body image. Several variables (e.g., gender, disordered eating, and symptoms of depression and anxiety) have been correlated with body image concerns among individuals pursuing bariatric surgery [1,2]. Most studies have utilized measures of body dissatisfaction focused on body shape and physical appearance in order to measure body image among bariatric surgery patients [3]. However, less research has been conducted on associated weight-related constructs (e.g., weight bias internalization), as well as positive facets of body image (e.g., body appreciation) among pre-surgical bariatric patients.

Weight bias internalization (or internalized weight bias) has been identified as a related, but distinct construct from body image [4], and defined as the process of individuals applying self-stigmatizing weight-related attitudes and beliefs to themselves [4]. To date, weight bias internalization has been associated with various disordered eating behaviors, particularly binge eating, among individuals pursuing bariatric surgery, even when considering the role of associated mental health symptoms (e.g., depression and anxiety) with disordered eating [5]. As emphasized by the American Society for Metabolic and Bariatric Surgery (ASMBS) [6], further research is necessary in order to provide the best clinical care and potential clinical interventions for bariatric patients with high levels of internalized weight bias. Relatedly, the role of internalized weight bias along with positive facets of body image has yet to be explored among pre-surgical bariatric patients. As such, given the potential relationship with problematic eating, mental health symptoms, and outcomes following surgery, an investigation of these variables represents a significant need in order to identify patients who may be at higher risk for suboptimal outcomes.

Throughout the past decade, body image science has focused on the construct of positive body image, defined as the love and respect individuals have for their bodies, in addition to respecting one’s body regardless of how it compares to societal ideals [7,8]. Positive body image does not fall on the same continuum as negative body image, as evidenced by individuals concurrently reporting feelings of body appreciation and dissatisfaction [9]. Therefore, research on body dissatisfaction among bariatric patients is not sufficient in

assessing the separate construct of positive body image among this population. To date, body appreciation has been the most studied facet of positive body image [10]. Regarding the relationship between body appreciation and body mass index (BMI), results have been mixed with some finding an inverse relationship between high levels of body appreciation and low BMI [11,12], whereas other have found no association [13,14]. Regarding eating behaviors, higher levels of body appreciation have consistently been associated with both lower levels of disordered eating behaviors, including binge eating [11,12] and higher levels of intuitive eating (i.e., adaptive eating in response to individuals' internal hunger and satiety cues as opposed to emotional eating behaviors) [15,16]. Furthermore, an increased level of body appreciation has even been discussed as a potential protective filter against aspects of body dissatisfaction [17].

In summary, body appreciation and weight bias internalization represent two underexplored body and weight-related areas that warrant further exploration among individuals pursuing bariatric surgery. Recently, some intervention studies among women with overweight or obesity have explored both body appreciation and weight bias internalization as related to weight loss and body image concerns [18,19]; however, a dearth in the literature exists in regard to measuring these constructs together among pre-surgical bariatric patients. In contrast to the general population of persons with obesity, patients who pursue bariatric surgery experience additional weight-related stigma [20], as well as place themselves at medical risk in the event of engaging in disordered or problematic eating behaviors, such as binge or loss of control eating, following surgery [21,22]. As such, research must further determine to what extent body appreciation and weight bias internalization uniquely contribute to disordered eating among bariatric patients, which could not only elucidate further associations with eating behaviors among this vulnerable population, but also pave the path for interventions to address body image concerns for individuals pursuing bariatric surgery.

The Present Study

The first aim was to examine the associations between body appreciation, weight bias internalization, disordered eating (e.g., binge eating, disinhibited eating), and symptoms of depression and anxiety among a sample of pre-surgical bariatric patients. It was hypothesized that low levels of body appreciation would be associated with high levels of weight bias internalization, disordered eating behaviors, and symptoms of depression and anxiety. The second aim was to explore the extent to which body appreciation and weight bias internalization account for unique variance in disordered eating behaviors, such as binge eating and disinhibited eating, among pre-surgical bariatric patients. It was hypothesized that body appreciation and weight bias internalization would significantly account for unique variance in disordered eating behaviors above and beyond symptoms of depression and anxiety.

2. Methods

2.1 Participants and Procedure

The sample was comprised of 319 adults between the ages of 19- and 72-years-old (M = 43.31, SD = 11.10) who presented for bariatric surgery at a large Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP)-accredited academic medical center in the Appalachia region of the United States. All patients were fluent in reading English. The sample consisted of cisgender women (77.1%) and men (22.9%). The majority of the sample was White (93.7%) with the remainder identifying as Black/African American (3.1%), Hispanic or Latinx (1.3%), Native American (0.6%), Asian/Pacific Islander (0.3%), or multiracial (0.9%). In terms of sexual orientation, the sample predominantly identified as heterosexual/straight (93.7%), with the remainder identifying as bisexual (2.5%), lesbian (1.3%), gay (0.9%), questioning (0.3%), or preferring not to disclose (1.3%). BMI was calculated as kg/m^2 based on self-reported height and weight and ranged from 36.02 to 80.66 (M = 49.62, SD = 7.90). A further breakdown of BMI was 35.0-39.9kg/m^2 (7.8%), 40.0-49.9kg/m^2 (54.2%), 50.0-59.9kg/m^2 (27.9%), 60.0-69.9kg/m^2 (7.5%), and >70.0kg/m^2 (2.5%).

Data were collected in a Health Insurance Portability and Accountability Act (HIPAA)-compliant, REDCap (Research Electronic Data Capture, Vanderbilt University, Tennessee) database between September 23rd, 2019 and August 15th, 2020. The Institutional Review Board (IRB) at the co-authors' institution approved all study procedures as an expedited protocol given the study was deemed as posing no more than minimal risk to patients.

2.2 Measures

All participants completed the following self-report questionnaires at the beginning of their standard pre-surgical psychological evaluation. As such, the collected data were reviewed retrospectively for the present study.

2.2.1. Body Appreciation Scale (BAS-2).—The BAS-2 [12] is a 10-item measure of body appreciation based on a 5-point scale (1 = *never*; 5 = *always*). Sample items include, "I appreciate the different and unique characteristics of my body" and "I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors)." A total body appreciation score is determined by averaging participants' responses to all 10 items, with higher scores suggesting greater levels of body appreciation. The BAS-2 has shown to have high internal consistency and three-week test-retest reliability [12]. To the authors' knowledge, no research has been published exploring body appreciation with the BAS-2 among pre-surgical bariatric patients.

2.2.2. Weight Bias Internalization Scale (WBIS).—The WBIS [4] is an 11-item measure that prompts respondents to answer each item based on a 7-point scale, where 1 is *strongly disagree* and 7 is *strongly agree*. A sample item includes, "I don't feel that I deserve to have a really fulfilling social life, as long as I'm overweight." A total score is calculated by reverse scoring two items followed by summing all of the items, with higher scores

indicative of greater internalized weight bias. The WBIS has been used and shown to have high internal consistency among samples of bariatric surgery patients [5,23,24].

2.2.3. Binge Eating Scale (BES).—The BES [25] consists of 16 items assessing behavioral, cognitive, and emotional binge eating symptoms. A total score is calculated based on summing all items, with higher scores indicative of more severe symptoms of binge eating. The BES has been used among samples of bariatric patients and has demonstrated good construct validity and high internal consistency [26,27].

2.2.4. Three-Factor Eating Questionnaire–Disinhibition (TFEQ-D).—The TFEQ [28] assesses three dimensions of eating behavior. For the present study, the Disinhibition subscale was examined as an aspect of disordered eating. The Disinhibition subscale consists of 16 items with the initial 13 items based on a true/false response format, and the remaining items based on a 4-point scale, where 1 is *never* and 4 is *at least once a week/ always*. High scores are indicative of a tendency for individuals to lose control of their eating, particularly during stressful situations or emotional distress. The measure has previously been used among patients pursuing bariatric surgery [26].

2.2.5. Beck Depression Inventory-II (BDI-II).—The BDI-II [29] is a 21-item measure of depression symptoms in the past two weeks based on a response scale from 0 to 3. Psychometric validity and high internal consistency among samples of bariatric surgery patients have been supported [26,30].

2.2.6. Beck Anxiety Inventory (BAI).—The BAI [31] consists of 21 items that assess various symptoms of anxiety over the past week with responses for each item ranging from 0 (*not at all*) to 3 (*severely*). The BAI has previously been used among bariatric surgery research and has shown to have adequate internal consistency and construct validity [32].

2.3. Statistical Analysis

All analyses were conducted using SPSS (IBM, New York) version 27.0. Outliers were explored for all demographic and study variables via boxplots. Multiple regressions and *t*-tests were conducted in order to assess for potential differences based on age, BMI, and gender on the study variables. Pearson correlations were explored in order to determine significant associations between all study variables.

A hierarchical multiple regression was conducted to explore whether the BAS-2 and WBIS each accounted for unique variance in binge eating symptoms while controlling for depression and anxiety. A second hierarchical multiple regression was conducted to explore whether the BAS-2 and WBIS each accounted for unique variance in disinhibited eating while controlling for depression and anxiety. Regression assumptions were assessed, including linearity, homoscedasticity, and normality. Multicollinearity was assessed via the variance inflation factor (VIF) values and deemed of concern if greater than 5. The Durbin-Watson test statistic was assessed to explore correlated error terms and was expected to be close to 2. For both multiple regressions, BDI-II and BAI were entered into the models first. In order to investigate the separate role of weight bias internalization and body appreciation, the WBIS and BAS-2 were entered into the models separately. In the second block, the

WBIS was entered, followed by the BAS-2 in the final block. Given previous research exploring internalized weight bias on disordered eating, but no published research on body appreciation among bariatric patients, the WBIS was entered into the model before the BAS-2 in order to assess for significant changes in the overall regression model when including BAS-2. The BES and TFEQ-D were entered as the outcome variable in the first and second model, respectively.

3. Results

Table 1 presents Pearson correlations between age, BMI, and all study variables. Age and BMI were not significantly correlated with any study variables (p-values > .05). Results of the multiple regressions with age and BMI on BES ($p = .70$) and TFEQ-D ($p = .72$) were not significant. In terms of gender, no differences between cisgender women or men were found on the BAS-2, WBIS, BES, or TFEQ-D (p-values > .05). Overall, no significant relationships were found among age, BMI, or gender in predicting binge or disinhibited eating.

Table 1 also presents Pearson correlations and descriptive statistics, including measures of central tendency and distribution, on all study variables. Significant correlations were found between low levels of the BAS-2 and high levels of the WBIS, BES, and TFEQ-D (p-values < .001).

For the regression models, normality statistics for the main study variables were within acceptable limits (skewness range = 0.12 to 0.63, kurtosis range = −0.28 to −0.62). VIF values ranged from 1.47 to 2.53, suggesting minimal concern with multicollinearity. For the regression model with BES as the outcome variable, the Durbin-Watson test statistic was 1.71. For the second regression with TFEQ-D as the outcome, the Durbin-Watson test statistic was 1.85. Thus, evidence was supported for uncorrelated error terms in both models.

Table 2 presents statistics, including unstandardized and standardized regression coefficients and standard errors, for both regression models. The multiple regression with BES as the outcome variable and BDI-II and BAI entered into the model first was statistically significant ($F(2, 316) = 56.81$, $p < .001$, $R^2 = .23$), with only BDI-II as a significant predictor ($p < .001$). In the second step of the model ($F(3, 315) = 52.11$, $p < .001$, $R^2 = .33$), a significant change from the first model was found ($F(1, 315) = 31.69$, $p < .001$, $\Delta R^2 = .07$), and WBIS ($p < .001$) was a significant predictor. In the final step of the model ($F(4, 314) = 32.73$, $p < .001$, $R^2 = .36$), a significant change from the second model was found ($F(1, 314) = 15.66$, $p < .001$, $\Delta R^2 = .03$), and BAS-2 was a significant predictor ($p < .001$). BDI-II ($p < .001$) and WBIS ($p = .02$) remained significant predictors in the final model.

The multiple regression with TFEQ-D as the outcome variable and BDI-II and BAI entered into the model first was statistically significant ($F(2, 316) = 34.45$, $p < .001$, $R^2 = .18$), with only BDI-II as a significant predictor ($p < .001$). In the second step of the model ($F(3, 315) = 29.20$, $p < .001$, $R^2 = .22$), a significant change from the first model was found ($F(1, 315) = 15.52$, $p < .001$, $\Delta R^2 = .04$), and WBIS ($p < .001$) was a significant predictor. In the final step of the model ($F(4, 314) = 23.10$, $p < .001$, $R^2 = .23$), a significant change from the

second model was found ($F(1, 314) = 3.98$, $p = .047$, $\Delta R^2 = .01$), and BAS-2 was a significant predictor ($p = .047$). BDI-II ($p < .001$) and WBIS ($p = .04$) remained significant predictors in the final model.

4. Discussion

The present study is the first, to the authors' knowledge, to examine both body appreciation (i.e., a facet of positive body image) and weight bias internalization using psychometrically validated measures among a sample of pre-surgical bariatric patients. The first hypothesis was supported based on the significant associations found between low levels of body appreciation and high levels of weight bias internalization, binge eating, disinhibited eating, and symptoms of depression and anxiety. Consistent with previous findings from the positive body image literature [11,12], an inverse relationship was found between body appreciation and binge eating behaviors.

In regard to body appreciation and internalized weight bias, it is unsurprising that an inverse relationship was found between these variables. In many ways, high levels of internalized weight bias, as measured on the WBIS (e.g., "I hate myself for being overweight") may reinforce low levels of body appreciation, as measured on the BAS-2 (e.g., "I feel love for my body") and vice-versa. Of note, it is possible for an individual to endorse internalized weight-related stereotypes, while still exhibiting appreciation for their body. This may particularly be the case for individuals pursuing bariatric surgery. Although individuals in this population may hold negative attitudes about themselves due to their weight, these individuals may still respect and appreciate their bodies. In fact, given the medical comorbidities diagnosed among bariatric surgery patients [33-35], perhaps the action of pursuing bariatric surgery is a demonstration of individuals in this population respecting their bodies in an effort to improve their health.

The second hypothesis was supported; that is, lower levels of body appreciation and higher levels of weight bias internalization significantly accounted for variance in binge eating symptoms and disinhibited eating behaviors. Previous research has supported the predictive quality of body appreciation on eating behaviors [36]. The present study expands this knowledge among a unique population of individuals who are expected to follow a particular style and pattern of eating. Among pre-surgical bariatric patients, results from the present study indicate that both low levels of respect for one's body and high levels of self-directed negative weight-related attitudes are associated with a greater frequency of binge eating, experiencing a loss of control while eating, and eating in response to stress or negative emotions.

These findings suggest several clinical implications for psychologists, as well as behavioral health and medical providers working with patients pursuing bariatric surgery. During a pre-surgical psychological evaluation, providers could incorporate questions to address aspects of positive body image, such as body appreciation. Relatedly, bariatric providers could include the BAS-2 as part of their psychological assessment in order to gain clinical insight in regard to patients' perceived level of love and respect for their bodies. Bariatric surgery programs that discuss body appreciation with their patients may foster a climate focused on

respect and value for the presence and function of one's body, rather than only focusing on body shape and physical appearance.

The present study also expands the field's understanding of internalized weight bias and disordered eating. Previous research has found that weight bias internalization significantly predicts disordered eating among postoperative bariatric patients above and beyond the impact of depression and other mental health symptoms [5]; however, it is notable that previous studies have not explored the additional role of positive body image. Overall, even when considering the role of body appreciation, results of the present study demonstrate the significant role of weight bias internalization and the importance of addressing it. Methods of doing this could be conducted via brief questionnaires, such as the WBIS, or clinical interviews. Postoperative assessments are also warranted. For example, preoperative psychological evaluations have shown to predict one-year postoperative appointment adherence along with postoperative weight loss [35]. Thus, expanding assessment of these variables in the postoperative period could increase therapeutic benefits of bariatric surgery.

Along with body appreciation and weight bias internalization, symptoms of depression significantly accounted for variance in binge eating symptoms and disinhibited eating behaviors. The study's findings are consistent with previous research on depressive symptoms and disordered eating among bariatric patients [37]. In general, although important to assess body appreciation and internalized weight bias, findings from the present study emphasize the importance of assessing for depression among pre-surgical bariatric patients. Furthermore, it may even be necessary to address clinical symptoms of depression prior to implementing previously mentioned positive body image interventions to maximize therapeutic effectiveness for pre-surgical bariatric patients.

Several areas of future research are encouraged based on this study. First, longitudinal research among bariatric patients pre- and postoperatively could explore possible changes in both body appreciation and weight bias internalization. Such research could also explore potential mechanisms that may further explain the relationship between body appreciation, weight bias internalization, and disordered eating. For example, emotion dysregulation has been found as a potential mediator among internalized weight bias and disordered eating among individuals pursuing bariatric surgery [23]. A similar relationship may also exist between body appreciation and disordered eating.

Second, in terms of clinical intervention, randomized controlled trials with evidence-based approaches (e.g., cognitive behavioral therapy) focused on targeting body appreciation among bariatric patients should be pursued. Given that higher levels of body appreciation were associated with a lower frequency of disordered eating in the present study, psychological interventions in bariatric surgery programs could be implemented with a focus on addressing both body appreciation and internalized weight bias. In fact, body image research has found that clinical interventions focused on positive body image may be more successful than attempting to decrease body dissatisfaction [38,39]. Treatment studies among persons with overweight and obesity have found similar results [18,19]. For example, in a pilot intervention study, women with overweight or obesity who received a cognitive

behavioral intervention compared to a control group reported an increase in self-reported levels of body appreciation after the intervention [19].

Lastly, it is encouraged that future research examine other facets of the multidimensional construct of positive body image, particularly ones that may be most relevant for individuals pursuing bariatric surgery. As one example, functionality appreciation has been studied as another facet of positive body image and defined as the level of respect and gratitude based on what one's body can do and is capable of doing for oneself (e.g., physical abilities, sensing and perceiving, and communicating) [40]. Given concerns with difficulties related to mobility [41], exploring the facet of functionality appreciation may provide further insight into the broader experience of body image among individuals pursuing bariatric surgery.

Limitations of the present study should be noted. The majority of the present study's sample was comprised of White, heterosexual, cisgender women; thus, generalizability of the findings are limited. Given that psychological clearance is one purpose of the routine psychological evaluation, demand characteristics may have played a role in terms of how patients responded to the survey items. Based on the cross-sectional design of the present study, it is not possible to provide causal conclusions. However, as previously discussed, longitudinal research could further explore a causal relationship between the study variables, as well exploring the role of body appreciation among postoperative bariatric patients.

5. Conclusions

In summary, the study of body image is necessary in order to fully capture psychosocial variables pertinent for patients pursuing bariatric surgery. Although body dissatisfaction has been associated with disordered eating among bariatric patients, the constructs of both body appreciation and internalized weight bias and their associations with binge eating and disinhibited eating behaviors and mental health symptoms had yet to be explored together prior to this study among pre-surgical bariatric patients. Findings support significant associations between low levels of body appreciation and high levels of weight bias internalization and disordered eating, including binge eating and aspects of disinhibited eating, including loss of control and emotional eating. Despite its limitations, results from the present study emphasize the importance of recognizing both the presence of positive body image and internalized weight bias among patients pursuing bariatric surgery, and provide implications for future research and clinical interventions among this stigmatized population.

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Highlights

- Low body appreciation was associated with high binge and disinhibited eating
- Low body appreciation was associated with high symptoms of depression and anxiety
- Body appreciation accounted for unique variance in disordered eating
- Weight bias internalization accounted for unique variance in disordered eating

Table 1.

Correlations and Descriptive Statistics for Age, BMI, and Study Variables (N = 319)

Variables	*M*	*SD*	α	1	2	3	4	5	6	7
1. Age	43.31	11.10	--							
2. BMI	49.62	7.90	--	−.16**						
3. BAS-2	3.05	0.95	.95	−.05	<.01					
4. WBIS	3.89	1.18	.87	.02	.02	−.73***				
5. BES	12.27	7.13	.88	.06	<−.01	−.53***	.52***			
6. TFEQ-D	5.96	3.24	.78	.06	.02	−.40***	.42***	.74***		
7. BDI-II	8.72	8.77	.93	.03	.03	−.56***	.62***	.51***	.42***	
8. BAI	7.45	8.25	.91	−.02	.05	−.33***	.40***	.27***	.22***	.66***

Note. *M* = mean, *SD* = standard deviation, α = Cronbach's alpha, BMI = body mass index, BAS-2 = Body Appreciation Scale-2, WBIS = Weight Bias Internalization Scale, BES = Binge Eating Scale, TFEQ-D = Three-Factor Eating Questionnaire-Disinhibition subscale, BDI-II = Beck Depression Inventory-II, BAI = Beck Anxiety Inventory.

** $p < .01$

*** $p < .001$.

Table 2.

Multiple Regressions of Body Appreciation and Weight Bias Internalization on Binge Eating and Disinhibited Eating (N = 319)

	Binge Eating (BES)					
	Step 1		**Step 2**		**Step 3**	
Predictors	***b (SE)***	***β***	***b (SE)***	***β***	***b (SE)***	***β***
BDI-II	0.47 (0.05)	.58**	0.30 (0.06)	.31**	0.25 (0.06)	.31**
BAI	−0.10 (0.06)	−.11	−0.09 (0.05)	−.11	−0.08 (0.05)	−.09
WBIS			2.00 (0.36)	.33**	1.02 (0.43)	.17*
BAS-2					−2.00 (0.50)	−0.27**
Full Model						
R^2	.26		.33		.36	
ΔR^2			.07**		.03**	
F-statistic	56.81**		52.11**		44.82**	
	Disinhibited Eating (TFEQ-D)					
BDI-II	0.18 (0.03)	.48**	0.12 (0.03)	.32**	0.11 (0.03)	.28**
BAI	−0.04 (0.03)	−.09	−0.03 (0.03)	−.09	−0.03 (0.03)	−.08
WBIS			0.69 (0.18)	.25**	0.44 (0.21)	.16*
BAS-2					−0.50 (0.25)	−.15*
Full Model						
R^2	.18		.22		.23	
ΔR^2			.04**		.01**	
F-statistic	34.45**		29.20**		23.10**	

Note. BAS-2 = Body Appreciation Scale-2, WBIS = Weight Bias Internalization Scale, BES = Binge Eating Scale, TFEQ-D = Three-Factor Eating Questionnaire-Disinhibition subscale, BDI-II = Beck Depression Inventory-II, BAI = Beck Anxiety Inventory.

* $p < .05$

** $p < .001$.