



Published in final edited form as:

J Consult Clin Psychol. 2017 November ; 85(11): 1095–1103. doi:10.1037/ccp0000258.

Form and Formulation: Examining the Distinctiveness of Body Image Constructs in Treatment- Seeking Patients with Binge-Eating Disorder

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Abstract

Objective—Body-image disturbance is a core aspect of eating disorders, yet the clinical manifestations of individuals' weight and shape concerns are complex, vary considerably, and are poorly understood by clinicians and researchers. This study aimed to distinguish different aspects of body-image disturbance – including weight/shape dissatisfaction, weight/shape overvaluation, weight/shape preoccupation, and fear of weight gain – in patients with binge-eating disorder (BED). Examining how each specific body image construct relates to biopsychosocial features of BED could contribute to the refinement of conceptualization and treatment planning.

Method—The current study assessed body-image disturbance and eating-disorder psychopathology in 748 treatment-seeking patients with BED using established investigator-based interviews reliably administered by doctoral clinicians.

Results—The four body image constructs, although related to one another, showed some important similarities in associations with biopsychosocial clinical features, as well as some important distinctions. The relation between overvaluation and self-esteem was, as conceptualized, more strongly negative than for other body image variables, and preoccupation was more associated than other body image variables with eating concerns. Biopsychosocial features of BED were associated with different forms of body-image disturbance, but associations of body image variables with BMI were not significant and associations with binge-eating frequency did not differ across body image variables.

Conclusion—Manifestations of body-image disturbance in BED are complex and understanding the distinctions between different body image constructs can contribute to treatment formulation.

Keywords

binge eating; body dissatisfaction; body image; obesity; weight concern

Facets of body image comprise complex cognitive schema for how an individual perceives his or her appearance, which can influence an individual's psychosocial and emotional functioning (Cash, 2004). Body image *dissatisfaction*, or negative feelings towards weight or shape, is thought to be quite common, even being described as a "normative discontent" among women (Rodin, Silberstein, & Striegel-Moore, 1984). Body dissatisfaction occurs at varying levels (Sarwer, Wadden, & Foster, 1998) across sex, racial/ethnic and age groups, and is generally associated with higher weight (Hrabosky & Grilo, 2007; Slevec & Tiggemann, 2011). Although individuals with obesity tend to have greater body dissatisfaction than their peers without obesity (Friedman & Brownell, 1995), research over the years has demonstrated that *within* groups of individuals with obesity, body dissatisfaction and weight are generally not related (Hrabosky & Grilo, 2007; Sarwer et al., 1998). Body-image disturbance is included as the core cognitive criterion for eating disorders, including anorexia nervosa ("Intense fear of gaining weight or of becoming fat" and "Disturbance in the way in which one's body weight or shape is experienced [or] undue influence of body weight or shape on self-evaluation") and bulimia nervosa ("Self-evaluation is unduly influenced by body shape and weight") (American Psychiatric Association, 2013), and has been suggested as a severity specifier for binge-eating disorder (BED) (Goldschmidt et al., 2010; Grilo et al., 2009; Grilo et al., 2008; Grilo, Masheb, & White, 2010).

Among patients diagnosed with eating disorders, body-image disturbance is conceptualized to have a central role in the maintenance of eating-disorder psychopathology (Fairburn, Cooper, & Shafran, 2003; Tabri et al., 2015). For some individuals, weight and shape take on a level of importance that impairs functioning, and most notably impairs individuals' evaluations of themselves. This importance, and the cognitive and behavioral efforts required to control weight, shape and eating, is thought to lead to weight and shape becoming the focus of individuals' daily lives. In turn, binge-eating episodes—during which individuals experience a sense of loss of control while eating an unusually large amount of food (American Psychiatric Association, 2013)—can be viewed partially as a result of the cognitive and behavioral attempts to over-control eating and therefore weight and shape. Indeed, one longitudinal study that tracked eating-disorder psychopathology and eating-disorder behaviors weekly found that when overvaluation occurred during one week, it was followed by non-compensatory weight-control behaviors (e.g., strict dieting) the subsequent week (Tabri et al., 2015). Consistent with this transdiagnostic cognitive-behavioral conceptualization of the role of overconcern with weight and shape as a core feature in the psychopathology and maintenance of eating disorders, individuals with BED who report overvaluation of their weight or shape have higher levels of overall eating-disorder psychopathology and distress, and lower self-esteem, compared with individuals with BED who do not report overvaluation (Grilo, 2013).

There are several specific cognitive constructs contained within body-image disturbance, which differ in meaning. Four of these are closely related yet conceptually distinct, and are included among the eating-disorder psychopathology items assessed by the Eating Disorder Examination (Fairburn & Cooper, 1993), an investigator-based interview that rigorously assesses the specific psychopathology of eating disorders (Berg, Peterson, Frazier, & Crow, 2011; Grilo, Masheb, & Wilson, 2001a): *dissatisfaction* with weight or shape, *overvaluation*

of weight or shape, *preoccupation* with weight or shape, and *fear* of weight gain. Overvaluation of weight or shape refers to when individuals' self-evaluation is excessively based on their weight or shape, or their ability to control their weight or shape (Cooper & Fairburn, 1993; Fairburn et al., 2003). Preoccupation with weight or shape occurs when individuals spend a lot of time thinking about their weight or shape *and* this interferes with their functioning, for example, feeling distracted while trying to follow a conversation because they are thinking about weight or shape (Fairburn & Cooper, 1993). Finally, fear of weight gain is an intense and definite fear associated with gaining weight or gaining more weight (Fairburn & Cooper, 1993).

Among these body image constructs, some of which have long been confused or used interchangeably (Cooper & Fairburn, 1993), researchers have increasingly clarified the distinction between dissatisfaction and overvaluation (Cooper & Fairburn, 1993; Masheb, Grilo, Burke-Martindale, & Rothschild, 2006; Wade, Zhu, & Martin, 2011). Overvaluation is conceptualized as having a stronger relation with self-esteem than does dissatisfaction, and this has been empirically supported (Cooper & Fairburn, 1993; Goldschmidt et al., 2011; Wade et al., 2011), whereas dissatisfaction has been shown to be more closely related to weight (Wade et al., 2011) and mood (Cooper & Fairburn, 1993; Goldschmidt et al., 2011; Goldschmidt et al., 2010). Accordingly, overvaluation has increasingly been the subject of clinical and research attention in BED, where it has consistently signaled greater severity in eating-disorder and some associated pathology despite not being associated with either binge-eating frequency or weight (Grilo et al., 2009; Grilo et al., 2008; Grilo, Masheb, et al., 2010; Grilo, White, & Masheb, 2012). This suggests that overvaluation is not merely a product of excess weight or more frequent binge eating, but rather, indicates greater *cognitive* psychopathology (Grilo, White, Gueorguieva, Wilson, & Masheb, 2013). Importantly, overvaluation has also been found to be a reliable predictor of greater impairment in quality of life (Harrison, Mond, Rieger, & Rodgers, 2015) and of poorer outcomes in controlled treatment trials (Grilo, Masheb, & Crosby, 2012; Grilo, White, Gueorguieva, Wilson, et al., 2013; Masheb & Grilo, 2008).

Most recently, research with non-clinical participants has produced further evidence that some of these body image constructs are related to different eating behaviors and psychopathology (Mitchison et al., 2017). Specifically, in an analysis of a community sample of adolescents, preoccupation was found to have a stronger relation with dietary restraint and binge eating among girls; however, preoccupation, dissatisfaction, and overvaluation had similar associations with eating behaviors and psychopathology among boys (Mitchison et al., 2017). Except for the growing convergence of evidence regarding the distinctiveness and importance of overvaluation in eating disorders and perhaps as a severity specifier for BED (Grilo, 2013), the other forms of body-image disturbance have been relatively neglected in terms of their relations to eating-disorder psychopathology in BED. Because of the complexities of body-image disturbance, examining these body image constructs could yield important understanding that would contribute to how clinicians and researchers conceptualize psychopathology and formulate treatments for patients with BED. Thus, the current study aimed to add to the accumulating evidence regarding overvaluation by examining the distinctiveness of four potentially relevant body image constructs, and by examining how each construct relates to biopsychosocial features of treatment-seeking

patients with BED: body mass index (BMI; physical), binge-eating frequency (behavioral), EDE eating concerns and EDE restraint (eating psychopathology), and BDI depressive distress and RSES self-esteem (general psychosocial functioning).

Method

Participants

Participants were 748 patients who met full *DSM-IV-TR* (American Psychiatric Association, 2004) research criteria for BED¹ and had responded to advertisements for treatment studies at a medical school in the northeastern United States. All treatment studies required, in addition to BED, co-existing overweight or obesity (Grilo, 2017a; Grilo, Masheb, & Salant, 2005; Grilo et al., 2014; Grilo, Masheb, Wilson, Gueorguieva, & White, 2011; Grilo, White, Gueorguieva, Barnes, & Masheb, 2013), except one (Grilo, Masheb, & Wilson, 2005). Participants were between 18 and 65 years old. Exclusionary criteria included: receiving treatment for eating or weight, medical conditions that influenced eating or weight (e.g., uncontrolled diabetes), severe mental illness that could interfere with clinical assessment (e.g., psychosis), or pregnancy. Overall, participants had a mean age of 45.77 ($SD = 9.82$) and a mean BMI of 38.06 kg/m² ($SD = 6.82$). Of the participants, 74.1% ($n = 554$) were female and 74.9% ($n = 560$) were White (Black, $n = 110$, 14.7%; Hispanic, $n = 47$, 6.3%; Other, $n = 31$, 4.1%). Participants had varying levels of education: high school or less than high school ($n = 139$, 18.7%), some college or an associate's degree ($n = 260$, 34.8%), or a college degree ($n = 344$, 46.0%); five participants did not report their education. This study received Institutional Review Board approval and all participants provided written informed consent prior to participation.

Measures

Participants were evaluated by trained doctoral-level research clinicians who were monitored to maintain reliability. Research clinicians administered the *Structured Clinical Interview for DSM-IV Axis I Disorders* (First, Spitzer, Gibbon, & Williams, 1997) to determine *DSM-IV*-based BED diagnosis and the semi-structured *Eating Disorder Examination* (Fairburn & Cooper, 1993) to confirm BED diagnosis and characterize eating-disorder psychopathology. Research clinicians also measured participants' height and weight to calculate BMI (kg/m²).

Eating Disorder Examination (EDE)—Version 12. The EDE is an investigator-based interview that evaluates eating-disorder psychopathology in the past 28 days, and over longer intervals as required to correspond with diagnostic criteria (Fairburn & Cooper, 1993). The EDE assesses binge-eating episodes (eating an unusually large amount of food and perceiving a loss of control over eating; this corresponds to the *DSM-IV* and *DSM-5* definitions of binge-eating episodes). The EDE also assesses eating-disorder psychopathology in four domains (Restraint, Eating Concern, Shape Concern, and Weight Concern). In the current study, we examined the variables related to body dissatisfaction

¹*DSM-IV-TR* (APA, 2004) BED research criteria include binge-eating episodes at least twice weekly (eating an unusually large amount of food while experiencing a loss of control) for six months, without weight-compensatory behaviors (e.g., purging). These criteria are more stringent than the formal BED criteria in the *DSM-5*, which require binge eating at least once weekly for three months.

(mean of weight dissatisfaction and shape dissatisfaction items), overvaluation (mean of overvaluation of weight and overvaluation of shape items), preoccupation with weight or shape (single item), and fear of weight gain (single item). Items are rated by the interviewer on a scale of 0 (none) to 6 (extreme); ratings reflect the modal severity for the past 28 days and 4 is considered to be the clinical cut-point (Fairburn & Cooper, 1993; Goldschmidt et al., 2010). The EDE is a well-established clinical research tool for the assessment of eating disorders with good inter-rater and test-retest reliability in BED (Grilo, Masheb, Lozano-Blanco, & Barry, 2004), including with racially- and ethnically-diverse groups (Grilo, Lozano, & Masheb, 2005). In the present study, inter-rater reliability of the EDE, examined in 71 cases, was excellent: intra-class correlation coefficients were 0.88 for binge-eating frequency and 0.91 for EDE global score (range 0.73–0.93 for scales). Internal consistency for the restraint scale was 0.62, and for the eating concerns scale was 0.62.

Beck Depression Inventory (BDI)—The BDI is a well-established measure of depressive features and symptoms (Beck & Steer, 1987). Items capture a broad range of negative affect associated with depression, and the BDI correlates as strongly with self-reported anxiety as self-reported depression; total scores on this scale are a useful indication of psychosocial distress (Beck, Steer, & Carbin, 1988; Grilo, Masheb, & Wilson, 2001b; Watson & Clark, 1984). The BDI has excellent psychometric properties with diverse samples (Beck et al., 1988). In the current study, the items yielded an internally consistent total score, $\alpha = .89$.

Rosenberg Self-Esteem Scale (RSES)—The RSES measures global self-esteem with excellent reliability and validity (Rosenberg, 1965) and has demonstrated good psychometric properties in research with patient groups similar to our study (Griffiths et al., 1999). In the current study, the items yielded an internally consistent total score, $\alpha = .90$.

Statistical Analyses

Data were examined for normality and multicollinearity; one variable, binge-eating frequency, was not normally distributed and a square-root transformation was used to achieve normality. No variables exceeded limits for multicollinearity using VIF and tolerance (Tabachnick & Fidell, 2007). Descriptive statistics and Pearson correlation coefficients were used to determine associations among body image constructs and between each construct and each biopsychosocial clinical domain: BMI, binge-eating frequency, EDE eating concerns, EDE restraint, BDI depressive distress, and RSES self-esteem. Correlations were compared using Fisher's *r*-to-*z* test. Multiple regression analyses included the body image constructs as independent variables and the biopsychosocial features as dependent variables. Semi-partial correlations allowed for comparison of each body image construct within each biopsychosocial variable in the context of the remaining body image constructs. Results were considered significant at $p < .05$.

Results

Descriptive statistics for the biopsychosocial domains and body image variables are summarized in Table 1, and correlations among body image constructs are summarized in

Table 2. Correlations were all significant at $p < .001$. The correlation between dissatisfaction and overvaluation was stronger than the correlation between dissatisfaction and preoccupation. The correlation between preoccupation and overvaluation was stronger than the associations between preoccupation and the other body image variables. Additionally, individuals endorsed clinical levels of body image constructs differentially (Table 3), all chi-square tests were significant ($p < .001$): among participants who scored 4 or higher on overvaluation of weight or overvaluation of shape, 97.7% of individuals also scored 4 or higher on dissatisfaction with weight or dissatisfaction with shape (but 83.1% of individuals above the clinical cut-point for dissatisfaction did *not* endorse overvaluation above the clinical cut-point), 29.7% of individuals scored 4 or higher on preoccupation with weight or shape, and 69.3% of individuals scored 4 or higher on fear of weight gain. Only 4.4% of individuals did not endorse clinical levels of any body image construct.

Correlations between the body image constructs and biopsychosocial variables were similar across body image variables (Table 4); however, there were a few notable exceptions. The correlation between preoccupation and eating concerns was stronger than the associations between other body image variables and eating concerns. The correlation between fear of weight gain and depressive distress was weaker than the associations between other body image variables and depressive distress. The association between self-esteem and overvaluation was more strongly negative, and the association between self-esteem and fear was less strongly negative, than most other body image variables.

Multivariable analyses, including semi-partial correlations and the contributions of each body image variable to the variance in the biopsychosocial feature, are presented in Table 5. Body image variables accounted for a significant proportion of the variance in BMI, $F(4,743) = 2.55, p = .038, R^2 = .014$; however, only fear of weight gain was a significant independent variable. Body image constructs, together, were significantly associated with binge-eating frequency, $F(4,743) = 4.83, p = .001, R^2 = .025$; no body image variable was significant on its own. Concern about eating was significantly accounted for by body image constructs, $F(4,743) = 126.61, p < .001, R^2 = .390$; all body image variables were significant. Restraint was significantly accounted for by body image constructs, $F(4,743) = 18.33, p < .001, R^2 = .090$; preoccupation and fear were associated with restraint. Body image constructs were also significantly associated with depressive distress, $F(4,743) = 53.74, p < .001, R^2 = .224$; all body image variables *except* fear were associated with depressive distress. Body image constructs also made significant contributions to the variance in self-esteem, $F(4,743) = 53.02, p < .001, R^2 = .222$; all body image variables *except* fear were significantly (inversely) associated with self-esteem.

Discussion

Body image concerns are not currently included among the diagnostic criteria for BED, yet notably, the great majority of patients had at least moderate concerns on a body image variable. Our findings indicate that body image variables are related to core and associated biopsychosocial features of BED suggest the complexities and relevance of body image concerns in the clinical formulation for BED. In particular, this study provides new findings regarding the overlap and distinctiveness of four different aspects of body-image disturbance

—weight/shape dissatisfaction, weight/shape overvaluation, weight/shape preoccupation, and fear of weight gain.

Although the body image constructs were statistically correlated with each other, the sizes of the correlations suggested distinctions. The distinctiveness was further supported by the patterns of non-overlap in groups categorized using clinical cut-points for the different body image constructs. Importantly, the specific forms of body-image disturbance were associated differentially with core and associated biopsychosocial features of BED in both correlational analyses (the relation of each body image variable with each biopsychosocial variable) and multivariable analyses (when each body image variable was considered in the context of other body image variables). Specifically, among patients with BED, greater overvaluation was associated with lower self-esteem and greater preoccupation was associated with greater eating concerns; fear of gaining weight was the only construct associated with BMI in multivariable analyses and appeared to have a weaker association with depressive distress than other body image variables. We emphasize that the four body image constructs were generally unrelated to BMI and binge-eating frequency within this group of patients with BED; these findings, which are consistent with prior research on body dissatisfaction among patients with obesity (Sarwer et al., 1998) and BED (Hrabosky & Grilo, 2007), speak to the complex cognitive aspects of body image that do not merely reflect concerns commensurate with level of excess weight. Additionally, body image variables accounted for less variance in restraint than in other biopsychosocial variables, which suggests that other factors in addition to body image variables may have a role in dietary restraint among patients with BED. Indeed, even when the behavioral presentation of BED is similar, patients may differ in their cognitive experience of BED.

Our findings extend prior research with BED demonstrating the distinctiveness of overvaluation and dissatisfaction (e.g., Wade et al., 2011). Factor-analytic studies have demonstrated this distinction in BED (Grilo, Crosby, et al., 2010; Grilo, Crosby, & White, 2012), obesity (Grilo, Henderson, Bell, & Crosby, 2013; Hrabosky et al., 2008), and non-clinical (Grilo, Reas, Hopwood, & Crosby, 2015) samples. Previous research has documented an association of overvaluation with eating-disorder psychopathology severity and with self-esteem (Grilo, 2013). In our study, the stronger relation of self-esteem with overvaluation than other body image constructs is consistent with this earlier work, which also demonstrates the shared emphasis of self-evaluation embedded in both general self-esteem and specific weight/shape overvaluation. Our findings extend this work in several ways by demonstrating distinctions for other related body image constructs. Notably, preoccupation was more strongly associated with higher eating concerns and fear of weight gain showed a unique pattern of a statistically significant association (albeit reflecting a small effect size) with BMI in the multivariable model (whereas body dissatisfaction, conceptualized to have a stronger relation with BMI, did not contribute to a significant portion of the variance in this psychosocial feature) and lesser association with depressive distress than the other three constructs.

Clinically, the differential associations of each body image construct across different biopsychosocial features suggest that it may be useful for clinicians to make these distinctions when performing their assessments and formulating treatments for BED.

Treatment for BED, from a cognitive-behavioral therapy (CBT) perspective, includes a conceptualization shared with the patient at the beginning of treatment (Fairburn, 2013). The purpose of this case formulation is to help the patient develop understanding of the factors that may maintain the cycle of eating behaviors and psychopathology and to create working hypotheses for the clinician to facilitate patient engagement in the active and “Socratic” treatment process. The transdiagnostic CBT conceptualization of eating disorders includes overvaluation of shape or weight as a factor maintaining binge eating and maladaptive eating/dieting behaviors (Fairburn et al., 2003). Our findings here point to refinement of body image assessment and how body image constructs can also be linked to the patient’s presenting eating behaviors and associated concerns (self-esteem, depression, and BMI). We cautiously offer a brief discussion of our findings within the broader context of potential implications for understanding the treatment literature for BED. Reviews of the treatment literature for BED suggest that two treatments, CBT and interpersonal psychotherapy (IPT) have the strongest evidence for effectiveness (Grilo, 2017b). Behavioral weight-loss counseling and certain medications appear to have less durable effects than CBT and IPT (Grilo, 2017b; e.g., Wilson, Wilfley, Agras, & Bryson, 2010). Greater body-image disturbance, as measured by weight and shape concerns, moderates treatment outcomes and suggests the superiority of CBT over behavioral weight-loss counseling (Sysko, Hildebrandt, Wilson, Wilfley, & Agras, 2010; Wilson et al., 2010) and pharmacotherapy (Grilo, Crosby, et al., 2012) for BED for those patients with greater severity. Interestingly, IPT does not address either eating behaviors or body image directly, but rather, presumably achieves outcomes by improving interpersonal functioning and competencies (Wilson et al., 2010); body-image disturbance does not moderate outcomes of CBT compared with IPT (Cooper et al., 2016).

CBT already addresses overvaluation in the treatment of eating disorders and does so partly by broadening an individual’s perspective on sources of self-esteem; our findings are consistent with the relevance of this treatment approach. Interventions can also be tailored to individuals based on their constellations of psychopathology. For example, negative affect is a known trigger for binge-eating episodes (Goldschmidt et al., 2012; Kenardy, Arnow, & Agras, 1996), and knowing that dissatisfaction, overvaluation, and preoccupation are associated with depressive distress and negative affect could allow a clinician to address this potential trigger within the CBT treatment framework. Additionally, when patients present with preoccupation, knowing that this may play a role in maintaining eating concerns could inform a cognitive-behavioral intervention or other interventions. For example, a recent pharmacological treatment study for BED observed significant reductions in preoccupied and obsessive thoughts about binge eating, along with reductions in binge-eating episodes (McElroy et al., 2016). Collectively, such findings suggest the relevance of preoccupation in BED as a target for assessment and treatment.

We note several strengths and potential limitations as a context for interpreting our findings and planning future research. Our findings are cross-sectional and therefore we emphasize that the direction of causality among the variables is uncertain. Prospective research could help to clarify the relations among these body-image variables and biopsychosocial features. We do note, however, that Tabri and colleagues (2015) demonstrated prospective temporal relationships with overvaluation being followed by dieting and exercise in patients with

anorexia nervosa and bulimia nervosa. More broadly, Sonnevile and colleagues (2015) reported longitudinal findings that among girls with overweight, the presence of overvaluation prospectively predicted the development of regular binge eating and greater impairment. Finally, treatment research with BED has documented the negative prognostic significance of overvaluation (Grilo, Crosby, et al., 2012; Grilo, White, Gueorguieva, Wilson, et al., 2013; Masheb & Grilo, 2008).

We emphasize that our findings pertain to a group of patients with BED who largely had BMIs in the overweight/obese range, and who sought treatment at an academic medical school. Generalizability to individuals with BED who do not seek treatment or who seek treatment in different clinical settings (Marques et al., 2011), or to those who do not wish to participate in treatment research is uncertain. Moreover, generalizability to patients with BED who do not have co-morbid overweight or obesity, and those who seek treatment for co-existing medical problems (e.g., uncontrolled diabetes) is also uncertain as their body image characteristics or treatment priorities may differ. Of note, nearly 75% of individuals with BED have a BMI in the overweight or obese range (Kessler et al., 2013). Yet, because body image concerns are associated with BMI in non-treatment-seeking samples that include individuals with healthy weight and excess weight (Friedman & Brownell, 1995), it is possible that the distinctiveness and associations of body image concerns may differ among the minority of individuals who have BED and healthy weight; future research should examine potential associations across weight categories. Additionally, participants were well-educated (80.8% had at least some college), primarily White (74.9%), and primarily women (74.1%); although the inclusion of minority-group members and men more closely approximates community data (Marques et al., 2011) than most research with treatment-seeking BED groups (see Franko et al., 2012), generalizability of our findings to groups with different demographic composition is uncertain. Specifically, we do not know how body image variables would related to biopsychosocial features of BED among individuals with less education or those identifying with different racial/ethnic groups. Finally, future research should also evaluate the relationships of these specific body image constructs to features of other specific eating disorders, such as anorexia nervosa and bulimia nervosa, as our findings for BED may not generalize to those diagnoses.

The results of this study emphasize the importance of clarifying the nature of body image concerns in the assessment and conceptualization of psychopathology and in clinical research studies for binge-eating disorder. Further research is needed to improve understanding of treatment-related needs, such as the influence of the different body image factors on treatment-seeking and whether they predict or moderate treatment outcomes.

Acknowledgments

This research was supported, in part, by National Institutes of Health grants K24 DK070052, R01 DK49587, and R01 DK073542. The authors report no conflicts of interest.

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Public Health Significance

The results of this study emphasize the importance of clarifying the nature of body image concerns in the conceptualization of psychopathology and in clinical research studies for binge-eating disorder. Among treatment-seeking research participants, different forms of body-image disturbance were associated with biopsychosocial features of binge-eating disorder, but not with BMI. Notably, associations suggest that among patients with binge-eating disorder and overweight/obesity, those who overvalue their weight and shape in their self-evaluations may have lower self-esteem, and those who experience more preoccupation with their weight or shape may have greater eating concerns.

Table 1

Means and standard deviations of body image constructs and biopsychosocial variables.

	<i>N</i>	<i>M</i>	<i>SD</i>
Dissatisfaction with Weight and Shape	748	4.75	1.10
Overvaluation of Weight and Shape	748	3.61	1.74
Preoccupation with Weight and Shape	748	1.57	2.35
Fear of Weight Gain	748	3.80	2.47
Measured Body Mass Index	748	38.06	6.83
Binge-eating Frequency	748	18.27	12.88
EDE Eating Concerns	748	2.10	1.32
EDE Restraint	748	1.85	1.31
BDI Depressive Distress	748	16.19	8.99
RSES Self Esteem	748	28.80	6.03

Note. EDE = Eating Disorder Examination, BDI = Beck Depression Inventory, RSES = Rosenberg Self-Esteem Scale. The potential range for EDE scores and body image constructs is 0 through 6; the potential range for BDI scores is 0 through 63; the potential range for RSES scores is 10 through 40.

Table 2

Correlations among body image constructs.

	<u>Dissatisfaction</u> <i>r</i>	<u>Overvaluation</u> <i>R</i>	<u>Preoccupation</u> <i>r</i>	<u>Fear</u> <i>r</i>
Dissatisfaction	-	.402_a	.237 _b	.307 _b
Overvaluation	.402 _a	-	.361 _a	.328 _a
Preoccupation	.237 _a	.361_b	-	.243 _a
Fear	.307 _a	.328 _a	.243 _a	-

Note. $N = 775$. All correlations were significant at $p < .001$. Subscripts with different letters denote significantly different ($p < .05$ for difference between Z scores) correlations within each row.

Table 3

Frequencies and distinctiveness of subclinical and clinical levels of overvaluation with dissatisfaction, preoccupation, and fear.

	Subclinical Overvaluation (weight and shape) <i>n</i> = 260 <i>n</i> (%)	Clinical Overvaluation (weight or shape) <i>n</i> = 488 <i>n</i> (%)	Chi-Square Test χ^2 (<i>p</i>)
Dissatisfaction			53.58 (< .001)
Subclinical (weight and shape)	44 (16.9%)	11 (2.3%)	
Clinical (weight or shape)	216 (83.1%)	477 (97.7%)	
Preoccupation			42.41 (< .001)
Subclinical	237 (91.2%)	343 (70.3%)	
Clinical	23 (8.8%)	145 (29.7%)	
Fear			49.91 (< .001)
Subclinical	149 (57.3%)	150 (30.7%)	
Clinical	111 (42.7%)	338 (69.3%)	

Note. Overlap between overvaluation at a clinical level (score of 4 on overvaluation of weight or overvaluation of shape) with clinical levels of other body image constructs (score of 4).

Table 4

Correlations among body image constructs and biopsychosocial variables.

	<u>Dissatisfaction</u> <i>R</i>	<u>Overvaluation</u> <i>r</i>	<u>Preoccupation</u> <i>r</i>	<u>Fear</u> <i>r</i>
Measured Body Mass Index	.061	.041	– .018	– .064
Binge-eating Frequency	.097 _a	.116 _a	.106 _a	.120 _a
EDE Eating Concerns	.348 _a	.429 _a	.531_b	.357 _a
EDE Restraint	.147 _a	.189 _a	.222 _a	.235 _a
BDI Depressive Distress	.335 _a	.371 _a	.343	.241_b
RSES Self-Esteem	– .286 _{a,c}	– .413_b	–.329 _{a,b}	– .220_c

Note. EDE = Eating Disorder Examination, BDI = Beck Depression Inventory, RSES = Rosenberg Self-Esteem Scale. Binge-eating frequency was square-root transformed. All correlations were significant ($p < .05$), except those correlations between body image constructs and BMI (all $p > .05$). Different subscripts denote significantly different ($p < .05$ for difference between Z scores) correlations within each biopsychosocial variable (row); bolded values were significantly different from most other body image constructs. Correlations between each body image construct and BMI were not compared because their correlations with BMI were not significant.

Table 5

Percent of variance in biopsychosocial variables explained uniquely by body image constructs.

Biopsychosocial Variable	Body Image Construct	R^2	Semi-partial R	Semi-partial R^2
Measured Body Mass Index		1.36%		
	Dissatisfaction		.069	0.47%
	Overvaluation		.046	0.21%
	Preoccupation		-.029	0.08%
	Fear		-.089	0.79%
Binge-eating Frequency ^a		2.53%		
	Dissatisfaction		.034	0.12%
	Overvaluation		.046	0.22%
	Preoccupation		.054	0.29%
	Fear		.070	0.49%
EDE Eating Concerns		39.05%		
	Dissatisfaction		.118	1.40%
	Overvaluation		.154	2.38%
	Preoccupation		.364	13.22%
	Fear		.148	2.19%
EDE Restraint		8.98%		
	Dissatisfaction		.030	0.09%
	Overvaluation		.057	0.32%
	Preoccupation		.137	1.88%
	Fear		.153	2.34%
BDI Depressive Distress		22.44%		
	Dissatisfaction		.165	2.73%
	Overvaluation		.170	2.88%
	Preoccupation		.195	3.79%
	Fear		.063	0.39%
RSES Self-Esteem		22.21%		
	Dissatisfaction		-.101	1.03%
	Overvaluation		-.244	5.94%
	Preoccupation		-.174	3.02%
	Fear		-.042	0.18%

Note. EDE = Eating Disorder Examination, BDI = Beck Depression Inventory, RSES = Rosenberg Self-Esteem Scale. Semi-partial correlations and their unique contribution to the variance in each dependent variable. Bolded values are significant ($p < .05$) independent variables.

^aBinge-eating frequency used a square-root transformation.