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Evaluation of the DSM-5 severity indicator for binge eating disorder in a clinical sample

Carlos M. Grilo^{a,b,*}, Valentina Ivezaj^a, and Marney A. White^{a,c}

^aDepartment of Psychiatry, Yale School of Medicine, United States

^bDepartment of Psychology, Yale University, United States

^cYale School of Public Health, United States

Abstract

Objective—This study tested the new *DSM-5* severity criterion for binge eating disorder (BED) based on frequency of binge-eating in a clinical sample. This study also tested overvaluation of shape/weight as an alternative severity specifier.

Method—Participants were 834 treatment-seeking adults diagnosed with *DSM-5* BED using semistructured diagnostic and eating-disorder interviews. Participants sub-grouped based on *DSM-5* severity levels and on overvaluation of shape/weight were compared on demographic and clinical variables.

Results—Based on *DSM-5* severity definitions, 331 (39.7%) participants were categorized as mild, 395 (47.5%) as moderate, 83 (10.0%) as severe, and 25 (3.0%) as extreme. Analyses comparing three (mild, moderate, and severe/extreme) severity groups revealed no significant differences in demographic variables or body mass index (BMI). Analyses revealed significantly higher eating-disorder psychopathology in the severe/extreme than moderate and mild groups and higher depression in moderate and severe/extreme groups than the mild group; effect sizes were small. Participants characterized with overvaluation ($N = 449$; 54%) versus without overvaluation ($N = 384$; 46%) did not differ significantly in age, sex, BMI, or binge-eating frequency, but had significantly greater eating-disorder psychopathology and depression. The robustly greater eating-disorder psychopathology and depression levels (medium-to-large effect sizes) in the overvaluation group was observed without attenuation of effect sizes after adjusting for ethnicity/race and binge-eating severity/frequency.

Conclusions—Our findings provide support for overvaluation of shape/weight as a severity specifier for BED as it provides stronger information about the severity of homogeneous groupings of patients than the *DSM-5* rating based on binge-eating.

Keywords

Binge eating; Obesity; Diagnosis; Severity; Body image

*Corresponding author. Yale University School of Medicine, 301 Cedar Street (2nd Floor), New Haven, CT 06519, United States. carlos.grilo@yale.edu (C.M. Grilo).

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1. Introduction

Binge-eating disorder (BED), included in Appendix B of the *Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV; APA, 1994)* as a research criteria set for further study, is a new formal diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5; APA, 2013)*. BED is defined by recurrent episodes of binge eating (eating unusually large amounts of food while experiencing a feeling of loss of control) and the absence of extreme weight compensatory behaviors (e.g., self-induced vomiting, laxative/diuretic abuse) that define bulimia nervosa (BN). Additional criteria require that the binge eating occurs an average of once-weekly during the past three months, be characterized by at least three of five behavioral indicators signaling loss of control over eating, and be associated with marked distress. Empirical research has supported the diagnostic validity and clinical utility of BED (Wilfley, Bishop, Wilson, & Agras, 2007; Wonderlich, Gordon, Mitchell, Crosby, & Engle, 2009) and its distinctiveness from obesity and other forms of disordered eating (Grilo et al., 2009; Grilo, Masheb, & White, 2010).

Questions about possible revisions or additions to improve the BED criteria set stimulated research leading up to *DSM-5* (Masheb & Grilo, 2000; Wilfley et al., 2007). Research supported a once-weekly frequency of binge-eating as a good signal or threshold for a clinically relevant problem (Wilson & Sysko, 2009) and the *DSM-5* revised the required frequency accordingly to once weekly for both BED and BN with the same duration requirement of three months. Research challenged the “unusually large amount” requirement for defining “binge eating” (Mond, Hay, Rodgers, & Owen, 2010) but this requirement was not changed in the *DSM-5*. Additional research included one study reporting acceptable diagnostic efficiency for the five behavioral indicators reflecting impaired control over eating (White & Grilo, 2011), one study supporting the required “marked distress” criterion (Grilo & White, 2011), and one study reporting enhanced test-retest reliability for the *DSM-5* BED criteria relative to the *DSM-IV* research criteria (Sysko et al., 2012).

DSM-5 added a new “severity specifier” for BED based on the frequency of binge eating. Four severity groups based on binge-eating frequency were defined as follows: mild (1–3 episodes per week), moderate (4–7 episodes per week), severe (8–13 episodes per week), and extreme (14 or more episodes per week). While research generally supported the new diagnostic criterion of once-weekly binge-eating frequency (Wilson & Sysko, 2009), the addition of the severity specifier for BED in the *DSM-5* was made in the absence of published empirical research. A recent study with a non-clinical sample of community volunteers categorized with BED yielded limited support for the new *DSM-5* severity indicator (Grilo, Ivezaj, & White, 2015). Specifically, almost no persons with BED were categorized with severe or with extreme severity; those categorized with moderate severity had greater eating-disorder psychopathology but not depression levels than those categorized with mild severity, although the magnitude of differences represented small effect sizes (Grilo et al., 2015). Further research is clearly needed, particularly with treatment-seeking patients with BED, to extend the preliminary findings reported by Grilo et al. (2015) based on self-report assessments of a non-clinical sample.

Although clinical and research perspectives suggested the need to add a cognitive body-image component to the BED diagnostic construct (Masheb & Grilo, 2000), the *DSM-5* did not make any relevant changes (Grilo, 2013). Clinically, disturbed body image is widely considered to be a core aspect of eating disorders (Grilo, 2013) and despite the fact that the other eating-disorder diagnoses include a body image criterion (e.g., “undue influence of body weight or shape on self-evaluation is required for the diagnosis of BN), body-image disturbance was not included in either the *DSM-IV* or *DSM-5* for BED (see Grilo, 2013). There are various ways that a construct of body-image disturbance could be part of a BED diagnosis, including serving as a diagnostic criterion, subtype specifier, or severity specifier (see Regier, Kuhl, & Kupfer, 2013).

Studies with relevant comparison groups have suggested that overvaluation of shape/weight should not serve as a required criterion for BED as this would exclude substantial numbers of patients with clinically significant problems (Grilo et al., 2009, 2008; Grilo, Masheb, & White, 2010). Diagnostic subtypes (i.e., delineated as “specify whether” in diagnostic criteria sets) define mutually exclusive and jointly exhaustive groupings within a diagnosis whereas diagnostic specifiers (i.e., delineated as “specify if” in diagnostic criteria sets), which are neither mutually exclusive nor jointly exhaustive, are intended to define more homogeneous groupings within the diagnosis who share features; specifiers thus convey clinical information relevant to management and/or prognosis (APA, 2013; Regier et al., 2013). Consistent empirical support has been reported for overvaluation of shape/weight to serve as a diagnostic severity specifier for BED. The presence of overvaluation of shape/weight in persons with BED is associated with significantly elevated eating disorder pathology and psychological distress (Goldschmidt et al., 2010; Grilo et al., 2009, 2008; Grilo, Masheb, & White, 2010; Grilo, White, & Masheb, 2012; Hrabosky, Masheb, White, & Grilo, 2007) and prospectively predicts treatment outcomes (Grilo, Masheb, & Crosby, 2012; Grilo, White, Gueorguieva, Wilson, & Masheb, 2013).

Thus, except for a preliminary study with a non-clinical sample of persons categorized with BED (Grilo et al., 2015), studies have yet to examine the new *DSM-5* severity specifier in patients with BED. The present study tested the *DSM-5* severity specifier for BED and an alternative severity specifier (overvaluation of shape/weight) in a large treatment-seeking clinical study group of adults with BED.

2. Methods

2.1. Participants

Participants were 834 adults with *DSM-5*-based BED; 211 (25.3%) were men and 623 (74.7%) were women. The racial/ethnic distribution for the study sample was: 72.3% ($n = 603$) White, 16.7% ($n = 139$) African American, 7.0% ($n = 58$) Hispanic-American, 1.2% ($n = 10$) Asian-American, and 2.9% reported “other.” Educationally, 20.1% ($n = 168$) had a high school degree or less, 34.9% ($n = 291$) attended some college, and 45.1% ($n = 376$) had a college degree; .1% ($n = 8$) did not report education level. The research was Yale IRB-approved and all participants provided written informed consent.

Participants were respondents to print advertisements soliciting individuals with concerns about binge eating for treatment studies at a medical school in an urban setting. Eligibility required age between 18 and 70 years, overweight (body mass index (BMI; weight (kg) divided height (m²))) between 25 and 55, in addition to BED. Exclusionary criteria included: concurrent treatment for eating/weight problems, medical conditions (e.g., diabetes or thyroid problems) that influence eating/weight, severe current neurological or psychiatric conditions requiring alternative treatments (psychosis, bipolar disorder), and pregnancy. These exclusion criteria were in place for medical safety reasons (in addition to typical treatment study method reasons) and were determined during assessments described below.

2.2. Procedures and assessments

Assessments were performed in-person at our facility by trained doctoral-level research clinicians who were supervised and monitored to maintain reliability over time. BED diagnoses were determined based on the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1996), which was given to assess for all axis I psychiatric conditions, and confirmed with the Eating Disorder Examination interview (see below). Diagnostic algorithms were used to create the *DSM-5* BED diagnosis and severity study groups. Medical and safety status were based on physical exam and laboratory testing. Height and weight (on a high-capacity digital scale) were measured during the assessment evaluation and were used to calculate BMI.

Eating Disorder Examination Interview (EDE; Fairburn & Cooper, 1993), a semi-structured, investigator-based interview, was administered to assess eating disorder psychopathology and to confirm the BED diagnosis. The EDE focuses on the previous 28 days except for diagnostic items, which are rated for *DSM*-based duration stipulations. The EDE assesses the frequency of *objective bulimic episodes* (OBE; i.e., binge-eating defined as unusually large quantities of food with a subjective sense of loss of control). The EDE also has four subscales reflecting eating disorder psychopathology (dietary restraint, eating concerns, weight concerns, and shape concerns) which are averaged to produce a total global score reflecting overall severity. The EDE is well established (Grilo, Masheb, & Wilson, 2001) and has demonstrated good inter-rater and test-retest reliability in BED (Grilo, Masheb, Lozano-Blanco, & Barry, 2004). Inter-rater reliability of the EDE, examined in $N = 71$ cases, was excellent: intra-class correlation coefficients (ICC) were .88 for OBEs and .91 for EDE global score (range .73–.93 for EDE scales).

Beck Depression Inventory (BDI; Beck & Steer, 1987) 21-item version is a well-established self-report (Beck, Steer, & Garbin, 1988) measure of symptoms of depression and – more generally – of negative affect and broad distress. Extensive research has reported strong psychometric properties with clinical samples (Beck et al., 1988). Research has demonstrated that the BDI also serves as a stronger marker for severity in BED including elevated psychopathology and impaired functioning (Stice et al., 2001).

2.3. Binge eating disorder severity specifier groups

2.3.1. Subgroups based on DSM-5 severity specifier—BED subgroups were created based on the *DSM-5* severity specifiers defined by the frequency of binge eating (i.e., OBE episodes on the EDE): mild (defined as 1–3 episodes per week), moderate (4–7 episodes per week), severe (8–13 episodes per week), and extreme (14 or more episodes per week).

2.3.2. Subgroups based on overvaluation of shape/weight—Overvaluation of shape/weight was assessed with two EDE interview items: “Over the past four weeks, has your *shape* influenced how you feel about (judge, think, evaluate) yourself as a person?” and “Over the past 4 weeks has your *weight* influenced how you feel about (judge, think, evaluate) yourself as a person?” The overvaluation items are rated using a 7-point forced-choice scale anchored with 0 (indicating no importance) to 6 (indicating supreme importance). Following prior studies with BED (Grilo et al., 2008, 2009), the overvaluation group included participants who reported that their shape and/or weight are high on the list of things that influence their self-evaluation (i.e., score ≥ 4 on either overvaluation item).

2.4. Statistical analysis

The severity categories for BED (i.e., the *DSM-5* severity specifier and the “alternative” specifier based on overvaluation of shape/weight) were each compared on demographic and clinical measures using general linear model (GLM) analysis of variance (ANOVA). Partial η^2 was calculated as an effect size (ES) measure. When ANOVAs revealed significant overall group differences, Scheffé post-hoc tests were performed to determine which specific severity groups differed. When testing the “alternative” severity specifier based on overvaluation of shape/weight, two additional ANCOVAs were performed to co-vary for binge-eating severity category and for binge-eating frequency, respectively. These ANCOVAs were planned *a priori* to test whether the overvaluation of shape/weight had significance above and beyond the *DSM-5* (APA, 2013) severity categories based on binge-eating frequency.

3. Results

3.1. Binge eating disorder: DSM-5 severity groups

The following *DSM-5*-defined BED severity patient groups (based on the frequency of binge eating episodes) were observed: 331 (39.7%) were categorized as mild (defined as an average of 1–3 episodes per week), 395 (47.4%) as moderate (4–7 episodes per week), 83 (10.0%) as severe (8–13 episodes per week), and 25 (3.0%) as extreme (14 or more episodes per week). Analyses compared mild, moderate, and severe/extreme severity groups.

Table 1 summarizes descriptive statistics and analyses for the demographic and BMI findings across the *DSM-5* mild, moderate, and severe/extreme severity groups; no significant differences were observed. Table 2 summarizes the clinical measures across the *DSM-5* severity groups for BED. ANOVAs revealed that the groups differed significantly on binge eating frequency (as expected given the method to create the categories) as well as on three of the four EDE subscales; the severity groups did not differ significantly on EDE

Restraint or EDE Global scores. Scheffe post-hoc tests revealed that the three severity groups differed significantly from each other on EDE Eating Concerns with significantly higher scores across the *DSM-5* severity groups. Scheffe post-hoc tests revealed that the severe/extreme group had significantly higher EDE Shape Concerns and Weight Concerns scores than the moderate and mild severity groups which did not differ from each other. Finally, ANOVAs revealed that the groups differed significantly on depression (BDI) scores with Scheffe post-hoc tests revealing that the moderate and the severe/extreme severity groups had significantly higher scores than the mild severity group. To place the above statistical testing findings in context, note that partial eta squared ranged from .014 (Weight Concern) to .053 for the clinical variables that differed significantly (other than binge eating) indicating that these are small effect sizes.

3.2. Binge eating disorder: overvaluation of shape/weight groups

Table 3 summarizes demographic variables and BMI for participants with BED categorized with (N = 449; 54%) and without (N = 384; 46%) overvaluation; no significant differences in age, ethnicity/race, education, or BMI were observed but the overvaluation group had a significantly higher proportion of women than the group without overvaluation (77.7% vs 71.1%); the partial eta squared value of .076 reflects a small effect size.

Table 4 summarizes clinical variables and statistical analyses for BED participants categorized with and without overvaluation. Note that the scores for the EDE weight and shape concern subscales were calculated as usual as well as without the weight and shape overvaluation items, respectively. ANOVAs revealed significant differences with the overvaluation group having higher scores reflecting greater severity on every clinical variable except for binge eating frequency. Partial eta squared values reflected medium to large effect sizes for three of the EDE scales and global score and small effects for EDE Restraint and depression (BDI) scores (.030 and .092, respectively). ANCOVA, adjusting for sex, revealed a similar pattern of significant findings without any attenuation of effect sizes. Finally, two additional ANCOVAs, adjusting for binge-eating severity category and for binge-eating frequency, respectively, revealed a similar pattern of significant findings as the ANOVAs including partial eta squared values that were not reduced when adjusting for binge-eating severity or frequency.

4. Discussion

This study, performed with a treatment-seeking clinical study group of 834 adults diagnosed with *DSM-5*-defined BED using semi-structured diagnostic and eating disorder interviews administered, yielded two main findings. First, the *DSM-5* severity specifier for BED received some support. Participants with BED categorized with severe/extreme severity had significantly greater eating-disorder psychopathology than participants categorized with moderate or mild severity and the moderate and severe/extreme groups had higher depression than the mild group. The observed differences between the *DSM-5*-based severity groups, however, reflected small effect sizes. Second, the findings provide further support for overvaluation of shape/weight as an alternative approach for specifying diagnostic severity (Grilo, 2013). Patients with BED with overvaluation of shape/weight had significantly greater eating-disorder psychopathology and depression levels than BED

patients without overvaluation. The observed differences between the two overvaluation groups on the clinical measures reflected medium to large effect sizes and were found to persist without attenuation after adjusting for binge-eating severity and binge-eating frequency. These findings extend those previously reported for a non-clinical sample of community volunteers (Grilo et al., 2015) and suggest that overvaluation of shape/weight be a diagnostic severity specifier for BED because it provides stronger information about the severity of homogeneous grouping of patients than the *DSM-5* specifier based on binge-eating frequency.

Our study included a large study group of treatment-seeking adults diagnosed with BED with diagnostic interviews and assessed for eating-disorder psychopathology with semistructured investigator-based interviews administered by trained and monitored doctoral research-clinicians. Our patient group was characterized by diverse sex (25.3% men) and ethnic/racial composition (27.3% non-white, including 16.7% African-American and 7.0% Hispanic-American) generally consistent with expected rates from epidemiologic studies of BED (Hudson, Hiripi, Pope, & Kessler, 2007) and population rates of minority groups in the study's geographic region. Our findings, however, may not generalize to patients with BED who are not overweight or obese, seek treatment at different types of health-care settings, have certain medical or psychiatric conditions that were selected as exclusionary criteria (for treatment-research or medical safety reasons), or are uninterested in participating in research. We do note that a study performed in generalist primary-care settings with a more ethnically diverse patient group with BED reported convergent findings for overvaluation of shape/weight (i.e., strong associations with heightened eating-disorder pathology and depression). Our findings are cross-sectional and the prognostic significance of these two different severity specifiers (*DSM-5*-based binge-eating frequency versus overvaluation of shape/weight) should be examined in future longitudinal studies of the course and outcomes of BED. To date, studies of predictors of treatment outcomes have generally supported the prognostic significance of overvaluation of shape/weight but not binge-eating frequency (Grilo et al., 2012, 2013). Further research across different treatment and health-care settings is warranted and should test additional and broader clinical, biomedical, and functional outcomes as validators.

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Table 1

Demographic and physical characteristics of participants with binge eating disorder across DSM-5 severity groups.

	Mild N = 331	Moderate N = 395	Severe/extreme N = 108	Test statistic	P value	Effect size
Age, mean (SD)	45.2 (9.9)	45.8 (10.0)	44.8 (10.5)	F (2, 831) = .55	.580	.001
Female, no (%)	247 (74.6%)	294 (74.4%)	82 (75.9%)	χ^2 (2, n = 834) = .10	.950	.011
Race/ethnicity, no (%) ^a				χ^2 (2, n = 834) = .20	.907	.015
White	242 (73.1%)	284 (71.9%)	77 (71.3%)			
Non-white	89 (26.9%)	111 (28.1%)	31 (28.7%)			
Education, no (%)				χ^2 (2, n = 826) = 3.98	.408	.069
High school or less	56 (17.1%)	78 (19.9%)	25 (23.4%)			
Some college	111 (33.9%)	140 (35.7%)	40 (37.4%)			
College graduate	160 (48.9%)	174 (44.4%)	42 (39.3%)			
Body mass index	38.1 (6.9)	38.1 (6.5)	37.9 (6.9)	F (2, 826) = .03	.970	.000

Table 2

Comparison of participants with binge eating disorder across *DSM-5* severity groups.

	Mild N = 331		Moderate N = 395		Severe/extreme N = 108		ANOVA		η^2	Posthoc
	M	sd	M	sd	M	sd	F			
OBE	8.7	(2.2)	18.9	(4.7)	44.5	(15.1)	1256.15***	.751	All	
Restraint	1.8	(1.2)	1.9	(1.3)	1.8	(1.4)	.61	.001	ns	
Eating Concern	1.8	(1.2)	2.1	(1.3)	2.8	(1.4)	23.11***	.053	All	
Shape Concern	3.5	(1.2)	3.7	(1.1)	4.1	(1.0)	12.68***	.030	bc	
Weight Concern	3.2	(1.0)	3.2	(1.1)	3.5	(1.1)	5.83**	.014	bc	
EDE global	2.6	(.9)	2.7	(.9)	3.0	(.9)	12.08	.028	ns	
BDI	14.7	(8.1)	16.9	(9.2)	17.9	(10.5)	7.58**	.018	ac	

Note. N = 834. OBE = objective bulimic episodes (binge eating); EDE = eating disorder examination; BDI = beck depression inventory; All = all groups statistically differed; ns = not significant. df ranged from (2826) to (2831).

 $p < .0001$

**
 $p < .01$.

a = mild versus moderate; b = moderate versus severe/extreme; c = mild versus severe/extreme.

Table 3

Demographic and physical characteristics of participants with binge eating disorder across overvaluation groups.

	No overvaluation (N = 384)	Overvaluation N = 449	Test statistic	p value	Effect size
Age, mean (SD)	45.7 (10.2)	45.2 (9.9)	F (1, 831) = .51	.476	.001
Female, no (%)	273 (71.1%)	349 (77.7%)	χ^2 (1, n = 833) = 4.82	.028	.076
White, no (%)			χ^2 (1, n = 833) = 1.36	.243	.040
White	270 (70.3%)	332 (73.9%)			
Non-white	114 (29.7%)	117 (26.1%)			
Education, no (%)			χ^2 (2, n = 825) = 2.65	.266	.057
High school or less	64 (16.9%)	95 (21.3%)			
Some college	139 (36.7%)	151 (33.9%)			
College graduate	176 (46.4%)	200 (44.8%)			
Body mass index	37.9 (6.7)	38.2 (6.8)	F (1, 826) = .37	.543	.000

Note: N = 833 of the overall N = 844 were categorized based on overvaluation of shape/weight.

Table 4
Comparison of participants with binge eating disorder across overvaluation groups.

	No overvaluation N = 384			Overvaluation N = 449			ANOVA		ANCOVA covary sex		ANCOVA covary OBE frequency		ANCOVA covary severity	
	M	Sd		M	sd		F	η^2	η^2	η^2	η^2	η^2	η^2	η^2
OBE past month	17.3	(12.5)		19.0	(13.3)		3.55	.004	.005		—		—	
Restraint	1.6	(1.2)		2.0	(1.4)		25.73***	.030	.028		.030		.030	
Eating concern	1.5	(1.1)		2.6	(1.3)		143.38***	.147	.142		.144		.144	
Shape concern ^a	3.2	(1.1)		4.1	(1.0)		175.17***	.174	.169		.171		.171	
Weight concern ^a	2.7	(1.0)		3.5	(1.0)		126.07***	.132	.127		.129		.129	
Shape concern	3.0	(1.1)		4.2	(.9)		341.00***	.291	.288		.288		.289	
Weight concern	2.6	(.9)		3.8	(.9)		404.12***	.327	.324		.324		.325	
EDE global ^b	2.2	(.8)		3.2	(.8)		330.73***	.285	.282		.282		.282	
BDI	13.2	(8.0)		18.7	(9.1)		84.07***	.092	.089		.090		.089	

Note. OBE = objective bulimic episodes (binge eating); EDE = eating disorder examination; BDI = beck depression inventory.

*** p < .0001. df ranged from (1826) to (1831) for ANOVAs and from (1825) to (1830) for ANCOVAs for sex, OBE frequency, and OBE severity.

^a Subscale without overvaluation items.

^b EDE global includes overvaluation items.