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## A Controlled Evaluation of the Distress Criterion for Binge Eating Disorder

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### Abstract

**Objective**—Research has examined various aspects of the validity of the research criteria for binge eating disorder (BED) but has yet to evaluate the utility of criterion C “marked distress about binge eating.” This study examined the significance of the marked distress criterion for BED using two complementary comparisons groups.

**Method**—A total of 1075 community volunteers completed a battery of self-report instruments as part of an internet study. Analyses compared body mass index (BMI), eating-disorder psychopathology, and depressive levels in four groups: 97 participants with BED except for the distress criterion (BED-ND), 221 participants with BED including the distress criterion (BED), 79 participants with bulimia nervosa (BN), and 489 obese participants without binge-eating or purging (NBPO). Parallel analyses compared these study groups using the broadened frequency criterion (i.e., once-weekly for binge/purge behaviors) proposed for *DSM-5* and the *DSM-IV* twice-weekly frequency criterion.

**Results**—The BED group had significantly greater eating-disorder psychopathology and depressive levels than the BED-ND group. The BED group, but not the BED-ND group, had significantly greater eating-disorder psychopathology than the NBPO comparison group. The BN group had significantly greater eating-disorder psychopathology and depressive levels than all three other groups. The group differences existed even after controlling for depression levels, BMI, and demographic variables, although some differences between the BN and BED groups were attenuated when controlling for depression levels.

**Conclusions**—These findings provide support for the validity of the “marked distress” criterion for the diagnosis of BED.

### Keywords

binge eating; DSM-5; bulimia nervosa; obesity; distress; depression

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Binge eating disorder (BED) is characterized by recurrent binge-eating (eating unusually large amounts of food while experiencing a subjective sense of loss of control), marked distress about the binge-eating, and the absence of inappropriate weight compensatory

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behaviors that characterize bulimia nervosa (BN). BED is a prevalent problem, occurring at nearly twice the frequency of BN and anorexia nervosa combined, and is strongly associated with obesity and elevated psychiatric and medical co-morbidity (Hudson, Hiripi, Pope, & Kessler, 2007).

Since the inclusion of BED in Appendix B of the *Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition (DSM-IV; APA, 1994)* as a research criteria set in need of further study, research has provided empirical support for various aspects of the validity of this diagnostic construct, particularly its distinctiveness from obesity and other eating disorders (Grilo et al., 2009; Grilo et al., 2008). Critical reviews have concluded that BED has demonstrated diagnostic validity and sufficient empirical evidence supports its inclusion in the *DSM-5* as a distinct and formal diagnosis (Wilfley, Bishop, Wilson, & Agras, 2007).

As we move toward the development of the *DSM-5*, a pressing question regarding the BED research diagnosis is whether revisions or additions to its criteria would improve the construct (Wilfley et al., 2007). Research has examined certain aspects of the research criteria for BED including, for example, the frequency and duration stipulation requirements for binge-eating (Wilson & Sysko, 2009), the “unusually large amount” requirement for determining binge-eating (Mond et al., 2010), and a cognitive criterion regarding body image (“overvaluation of shape/weight”) which is required for BN but notably absent from the research criteria for BED (Grilo et al., 2008, 2009). In contrast, almost no research has examined the validity of other aspects of the BED diagnosis; notably, only one study has examined the utility of the behavioral indicators of impaired control used to determine the loss of control aspect of binge-eating (White & Grilo, 2011) and no study has been reported testing the diagnostic utility of Criterion C – i.e., the “marked distress” requirement – for the diagnosis of BED.

This study examined the significance of Criterion C - marked distress about binge-eating - for BED using two complementary comparisons groups. We compared four groups: participants with BED except for the distress criterion, participants with BED including the distress criterion, participants with BN, and obese participants without binge-eating or purging. Parallel analyses compared these study groups using the broadened frequency criterion (i.e., once-weekly for binge-eating and purging behaviors) proposed for *DSM-5* and the *DSM-IV* twice-weekly frequency criterion. We used the internet to recruit participants for an on-line survey rather than a treatment-seeking or clinic-based sample.

## Methods

### Participants

Participants were 1075 community volunteers drawn from a larger series of 2863 respondents to online advertisements seeking volunteers aged 18 years or older for a research study about eating and dieting. Participants were selected from the larger sample per criteria used to define our four study groups (described below). Advertisements with a link to a web survey were placed on Craigslist internet classified ads in various US cities. The participant group was 13.6% male (n=146) and 86.1% female (n=926); n=3 participants did not report gender. The racial/ethnic distribution for the study sample was: 78.9% Caucasian, 6.5% Hispanic, 6.9% African American, 3.6% Asian, and 4.1% reported “other” or missing.

### Procedures and Assessments

Participants completed questionnaires through SurveyMonkey, a secure online data gathering website server. No personal identifying information was collected. Participants were required to provide informed consent. The study was approved by the Yale IRB.

Participants provided basic demographic information, self-reported height and current weight, and completed a battery of self-report measures. *Questionnaire for Eating and Weight Patterns - Revised* (QEWP-R; Yanovski, 1993) assesses the specific diagnostic criteria for BED and BN as well as historical eating/weight variables. The QEWP-R has received psychometric support in diverse obese and eating-disorder groups (Barnes, Masheb, White, & Grilo, 2011; Celio, Wilfley, Crow, Mitchell, & Walsh, 2004; Nangle, Johnson, Carr-Nangle, & Engler, 1994). QEWP-R scores on the distress criterion were significantly correlated with those assessed by the EDE interview in a study group of obese patients with BED (Barnes et al., 2011). *Eating Disorder Examination Questionnaire* (EDE-Q; Fairburn & Beglin, 1994), which focuses on the past 28 days, assesses the frequency of objective bulimic episodes (OBEs; defined as feeling a loss of control while eating unusually large quantities of food), inappropriate weight control purging methods, and comprises four subscales (Dietary Restraint, Eating Concern, Shape Concern, and Weight Concern). The EDE-Q has demonstrated good test-retest reliability (Reas, Grilo, & Masheb, 2006), convergence with the EDE interview (Barnes et al., 2011; Grilo, Masheb, & Wilson, 2001a; Mond, Hay, Rodgers, & Owen, 2007) and has very good reliability for assessing purging (Mond et al., 2007). *Beck Depression Inventory* (BDI; Beck & Steer, 1987) is a 21-item measure of depressive symptoms, and - more generally - of negative affect; it performs well as a marker for broad distress (Grilo, Masheb, & Wilson, 2001b; Watson & Clark, 1984). Studies have reported good internal consistency (generally  $\alpha$  range .81 to .86) and convergent validity with clinician ratings of depression and distress ( $r = .60$  to  $.72$ ; Beck, Steer, & Garbin, 1988). The BDI showed excellent internal consistency in this study ( $\alpha = .91$ ).

### Creation of Study Groups

Four study groups were created based on responses to the QEWP-R and EDE-Q: 160 participants with BED except for the distress criterion<sup>1</sup> (BED-ND), 296 participants with BED including the distress criterion<sup>2</sup> (BED), 130 participants with BN, and 489 obese (body mass index [BMI]  $\geq 30$ ) participants without binge-eating or purging (NBPO). These study groups were created first using a minimum frequency of once-weekly binge-eating (QEWP-R) without any purging (self-induced vomiting, laxative misuse, or diuretics) behaviors (for BED), a minimum frequency of once-weekly for both binge-eating and purging behaviors (for BN<sup>3</sup>), and absence of both binge-eating and purging (for NBPO). This approach followed research supporting broadening the required frequency criterion from twice-weekly to once-weekly for both BED and BN (Wilson & Sysko, 2009). We also created a parallel set of four study groups based on *DSM-IV* twice-weekly frequency stipulations to perform a parallel series of analyses as a further test of the validity of the distress criterion findings. Group sizes when restricting to this more conservative frequency criterion were: 97 BED-ND, 221 BED, 79 BN, and 489 NBPO<sup>4</sup>.

### Statistical Analysis

General linear model (GLM) analysis of variance (ANOVA) was used to compare the four groups on the clinical measures. In addition, partial  $\eta^2$ , an effect size (ES) measure, was

<sup>1</sup>Participants in the BED-ND group endorsed the QEWP-R item "In general, during the past six months, how upset were you by the feeling that you couldn't stop eating or control what or how much you were eating?" at a level of "not at all," "slightly", or "moderately."

<sup>2</sup>Participants in the BED with distress group endorsed the QEWP-R distress item at a level of "greatly" or "extremely."

<sup>3</sup>Participants categorized in the BN group reported undue influence of body shape/weight in self-evaluation as determined with a score of 4 or more on those items on the EDE-Q (which corresponds with a rating of 'moderate importance' or greater).

<sup>4</sup>In contrast to the lower observed rates of BED-ND, BED, and BN with the more restrictive twice-weekly *DSM-IV* frequency requirements, the rate of NBPO did not change because we applied the same requirement of no binge-eating (assessed by the QEWP-R) and no purging to create this study group for both sets of analyses.

calculated; these values represent the proportion of variation in the criterion measure accounted for by group membership. When ANOVAs revealed significant overall group differences, Scheffe post-hoc tests were performed to determine which specific groups differed. A parallel series of ANCOVAs was performed controlling for BDI scores. This was indicated to test whether the “marked distress” about binge-eating criterion had significance above and beyond the levels of broad distress and negative affect reflected in BDI scores (Grilo et al., 2001b; Watson & Clark, 1984). ANCOVAs controlling for BDI were planned *a priori* since higher levels of depressive/negative affect signal more disturbed subtypes of patients with BED (Grilo et al., 2001b) and BN (Stice, Bohon, Marti, & Fischer, 2008). In addition, ANCOVAs were performed controlling for group differences in BMI and demographic factors (age, gender, and ethnicity) given well-established differences on these variables across BED and BN (Hudson et al., 2007). When ANCOVAs revealed significant overall group differences, for post-hoc tests, Bonferroni correction was performed on the variable-adjusted contrasts.

## Results

Table 1 summarizes demographic variables and findings for the four groups. The NBPO group had a significantly higher mean age than the BN and BED groups. Gender also differed significantly across groups, with a greater percentage of male participants in the BED-ND group compared to all other groups, and a greater percentage of female participants in the BN group compared to the BED and NBPO groups. The BED group had significantly higher proportion of white participants than the NBO and BN groups; the other groups did not differ from each other.

Table 2 summarizes descriptive statistics and statistical analyses comparing the four groups on the clinical measures. ANOVAs revealed that the four groups differed significantly in all clinical measures, including BMI, binge-eating, EDE subscales and Global score, and BDI scores. Scheffe post-hoc tests revealed several significant specific differences. In terms of BMI, the BED-ND and BN groups did not differ significantly from each other; both BED-ND and BN groups had significantly lower BMI than the BED group, which in turn had lower BMI than the NBPO group. All groups differed in the frequency of binge-eating episodes reported during the previous 28 days. On the EDE subscales and BDI, the BED-ND and NBPO groups did not differ significantly from one another, but all other groups differed. The pattern of differences was such that the BN group had the highest subscale scores, followed by BED, with the BED-ND and NBPO groups reporting significantly lower EDE subscale, EDE-Global, and BDI scores.

Table 2 summarizes findings from three separate ANCOVAs controlling separately for BDI, for BMI, and for demographic variables (age, gender, and ethnicity). The three sets of ANCOVAs revealed significant overall group differences on all of the clinical variables. The overall group differences (reflected in the F values and the partial eta-squared effect sizes) and the post-hoc tests with Bonferroni correction revealed a generally similar patterning of differences as described in detail for the Scheffe post-hoc (ANOVAs) comparisons above. Overall, the BED-ND and NBPO did not differ significantly (except for BMI, Eating Concerns, and binge-eating), the BED group had significantly greater eating-disorder psychopathology than the BED-ND and NBPO groups, and the BN group generally had significantly higher eating-disorder psychopathology than the other groups, although the BN and BED did not differ significantly in EDE Shape- and Weight-Concern subscales.

Table 3 summarizes findings from a series of ANOVAs and three separate ANCOVAs comparing the study groups created using the twice-weekly frequency stipulations for binge/

purge behaviors. The patterning of findings was quite similar to that described above based on once-weekly frequency stipulations.

## Discussion

This study yielded two primary findings. First, the findings provide clear support for the importance of marked distress about binge-eating as a required criterion for the BED diagnosis. Second, our findings provide further support for the validity of BED and for broadening of the required frequency of binge-eating from twice to once-weekly.

The *DSM-IV* research criteria for BED include the required criterion C that there exists marked distress about binge-eating. Our analyses revealed a highly consistent pattern of group differences before and after controlling for several potential confounding variables. The BED group had significantly greater eating-disorder psychopathology and depressive levels than the BED-ND group. The BED group, but not the BED-ND group, had significantly greater eating-disorder psychopathology than the NBPO comparison group. The BN group had significantly greater eating-disorder psychopathology and depressive levels than all other groups. The group differences existed even after controlling for group differences in BMI, demographic variables (age, gender, and ethnicity), and BDI scores, although some differences between BN and BED groups attenuated when controlling for BDI. Collectively, these findings indicate the importance of marked distress about binge-eating as a required criterion for the BED diagnosis. Specifically, our findings indicate that if marked distress about binge-eating were not required for the BED diagnosis, a substantial increase in the number of persons who would receive the diagnosis would likely occur but that this added group differs little in eating-disorder psychopathology and associated depression levels from obese persons who do not binge-eat or purge.

Our study has a number of strengths and limitations that should be considered when interpreting the findings. One limitation is our reliance on self-report which may be unreliable or biased. Our self-report eating-disorder measures (QEWP-R and EDE-Q) are widely-used (e.g., the QEWP-R was used in *DSM-IV* field trials) and research has provided psychometric support including acceptable convergence with EDE interview methods (Barnes et al., 2011; Celio et al., 2004; Grilo et al., 2001a; Nangle et al., 1994). Nonetheless, our study groups were created based on self-report, rather than clinician-derived diagnoses based on diagnostic interviews (Grilo et al., 2001a). Conversely, self-report methods may remove some interpersonal embarrassment - which is well known to be present among persons with eating disorders and obesity - and therefore facilitate disclosure of sensitive material. We note that our study groups are essentially a sample of convenience based on self-selected persons who volunteered for an internet study. Although the additional anonymity afforded by the internet may have also facilitated disclosure of sensitive material, reliance on the internet may be associated with other biases. The internet is increasingly used by many people for a variety of health-related issues but its use is greatest among persons aged less than 65, women, and those with higher education levels (Baker, Wagner, Singer, & Bundorf, 2003; Rice, 2006). Thus, the generalizability of our findings based on internet methods must be considered within this context. It is possible that our findings may not generalize to males or to certain ethnic/racial minority groups who may have been under-represented in our study (14% men and 21% non-white, respectively) perhaps reflecting partly some known disparities in internet use (Baker et al., 2003; Rice, 2006). However, epidemiologic studies of binge-eating and obesity (Hudson et al., 2007) and BN (Darby et al., 2009; Zachrisson et al., 2008) have reported demographic correlates similar to those of our study groups. Generalizability of our findings to clinical samples is also uncertain. Nonetheless, our findings have value in that they can be considered alongside future research on treatment-seeking clinical samples that, in turn, also have potential

confounds (Grilo, Lozano, & Masheb, 2005). We also note that our BN group had a higher BMI than expected in that most participants with BN in clinical studies are not overweight. However, recent epidemiologic studies have reported an increased risk of both BN and eating disorder not-otherwise-specified in overweight and obese persons (Zachrisson, Vedul-Kjelsas, Gotestam, & Mykletun, 2008) and recent increases in prevalence rates for co-morbid eating disorders/obesity have been greater than for either eating disorders or obesity alone (Darby et al., 2009).

In terms of strengths, this study is the first to examine the utility of the distress criterion for the BED diagnosis and our recruitment of participants allowed for the creation of two different relevant and complementary comparison groups – obese persons who do not binge-eat or purge and persons with BN. Our study group sizes were large and provided ample power. We were able to examine the utility of the distress criterion using two different frequency stipulations for binge/purge behaviors – i.e., the twice-weekly criterion of the *DSM-IV* and the once-weekly criterion under consideration for the *DSM-5*. ANCOVAs controlling for various potential confounds produced consistent patterning of results suggesting the importance of the marked distress criterion. In particular, the importance of marked distress was evident even after controlling for group differences in BDI scores. This is an especially important finding as it speaks to the “specificity” of distress specific to binge-eating rather than merely to the presence of depressive symptoms. The BDI is well-known to capture broad negative affect (Watson & Clark, 1984), not just depressive affect, and it performs well as a marker for broad distress. Studies with both BED (Grilo et al., 2001b) and BN (Stice et al., 2008) have found that patients with high BDI represent a more disturbed variant. Our findings, which provide specific support for the criterion “marked distress about binge-eating,” are also timely in a broader sense given emerging debate regarding whether distress should be considered a symptom of psychiatric disorders, a marker of distress, or neither (Phillips, 2009).

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Table 1

Demographic characteristics of participants across four study groups created based on once-weekly frequency stipulations.

	BED-ND N=160	BED N=296	BN N=130	NBPO N=489	Test Statistic	P value	Effect size
Age, mean (SD) <sup>a</sup>	35.6 (12.6)	35.8 (12.2)	32.1 (10.5)	38.5 (12.3)	F(3, 927)=9.22	<.001	.029
Female, No (%)	123 (76.9%)	262 (88.8%)	123 (95.3%)	418 (85.7%)	$\chi^2$ (3, n=1072)=22.81	<.001	.146
Ethnicity, No (%) <sup>b</sup>							
Caucasian	128 (80.0%)	251 (85.4%)	97 (75.2%)	372 (76.4%)	$\chi^2$ (3, n=1075)=10.07	.018	.097
African-American	8 (5.0%)	8 (2.7%)	7 (5.4%)	51 (10.5%)			
Hispanic	9 (5.6%)	17 (5.8%)	17 (13.2%)	27 (5.5%)			
Asian	11 (6.9%)	11 (3.7%)	4 (3.1%)	13 (2.7%)			
Other	4 (2.5%)	7 (2.4%)	4 (3.1%)	24 (4.9%)			

Note: BED-ND = binge eating disorder – no distress (i.e., no marked distress criterion); BED = binge eating disorder; BN = bulimia nervosa; NBPO = no-binge-eating/purging obese comparison group

<sup>a</sup> Posthoc Scheffe test found that NBO significantly differs from BN and BED. There were no other group differences.

<sup>b</sup> Specific group comparisons revealed a greater percentage of white participants in the BED group versus the BN and NBPO groups.



**Table 2**

Comparison of participants across four study groups created based on once-weekly frequency stipulations.

	BED-ND (n=160)		BED (n=296)		BN (n=130)		NBPO (n=489)		ANOVA		Covary for BDI		Covary for age, sex, race					
	M	sd	M	sd	M	sd	M	sd	F	$\eta^2$	posthoc	F	$\eta^2$	posthoc	F	$\eta^2$	posthoc	
BMI	31.8	(9.0)	34.3	(10.0)	29.8	(9.2)	37.8	(6.8)	43.00	.108	acdef	49.05	.135	bcdef				.089
EDE-Q Restraint	1.8	(1.3)	2.5	(1.6)	3.8	(1.5)	2.1	(1.5)	54.61	.133	abdef	37.70	.107	abdef				.121
EDE-Q Eating Concern	1.8	(1.2)	3.2	(1.4)	4.0	(1.4)	1.5	(1.2)	195.67	.355	abdef	123.15	.281	ALL				.330
EDE-Q Shape Concern	3.7	(1.4)	4.9	(1.0)	5.3	(0.8)	4.0	(1.4)	70.15	.168	abdef	32.12	.093	abef				.143
EDE-Q Weight Concern	3.2	(1.3)	4.3	(1.1)	4.7	(0.9)	3.4	(1.3)	75.49	.178	abdef	33.56	.096	abef				.151
EDE-Q Global	2.6	(1.0)	3.7	(1.0)	4.5	(0.9)	2.8	(1.1)	136.89	.283	abdef	78.35	.199	abdef				.254
OBE	4.2	(5.0)	7.9	(7.8)	12.6	(12.8)	0.6	(1.9)	155.54	.306	ALL	110.88	.262	ALL				.307
BDI	14.6	(9.1)	19.7	(10.0)	24.8	(10.3)	14.6	(9.5)	43.42	.121	abdef							.148

Note. Note: BED-ND = binge eating disorder – no distress; BED = binge eating disorder; BN = bulimia nervosa; NBPO = no-binge-eating/purging obese comparison group; BMI = body mass index; EDE-Q = eating disorder examination - questionnaire; OBE = objective bulimic episodes determined by EDE-Q; BDI = beck depression inventory.

All F-ratios significant at  $p < .001$ , df ranged from (3, 948) to (3, 1070).

Posthoc tests (Scheffe for ANOVAs; Bonferroni for ANCOVAs) indicate significant group differences as follows: a: BED-ND vs. BED; b: BED-ND vs. NBPO; c: BED-ND vs. BN; e: BED vs. NBPO; f: BN vs. NBPO. ALL indicates that all groups significantly differed.

**Table 3**

Comparison of participants across four study groups created based on twice-weekly frequency stipulations.

	BED-ND (n=97)		BED (n=221)		BN (n=79)		NBPO (n=489)		ANOVA		Covary for BDI		Covary for BMI		Covary for age, sex, race		
	M	sd	M	sd	M	sd	M	sd	F	$\eta^2$	posthoc	F	$\eta^2$	posthoc	F	$\eta^2$	
BMI	32.7	(8.8)	34.7	(9.8)	29.7	(10.0)	37.8	(6.8)	30.40	.094	cdef	34.92	.119	bcdef			.081
EDE-Q Restraint	1.8	(1.4)	2.4	(1.6)	4.0	(1.4)	2.1	(1.5)	40.79	.122	abdf	27.43	.096	abdf			.117
EDE-Q Eating Concern	2.0	(1.2)	3.3	(1.4)	4.4	(1.3)	1.5	(1.2)	182.92	.384	ALL	113.40	.305	ALL			.364
EDE-Q Shape Concern	3.9	(1.4)	4.9	(1.0)	5.4	(0.8)	4.0	(1.4)	47.09	.142	abef	18.10	.065	abef			.123
EDE-Q Weight Concern	3.2	(1.2)	4.3	(1.1)	4.8	(0.9)	3.4	(1.3)	52.04	.154	abef	20.24	.073	abef			.132
EDE-Q Global	2.7	(1.1)	3.7	(1.0)	4.6	(0.8)	2.8	(1.1)	103.67	.267	abdef	55.22	.176	abdef			.244
OBE	5.2	(5.5)	9.1	(8.3)	16.0	(14.6)	0.6	(1.9)	182.35	.385	ALL	127.61	.333	ALL			.388
BDI	15.3	(9.3)	20.4	(10.3)	26.6	(10.8)	14.6	(9.5)	40.93	.136	abdef						.126

Note. Note: BED-ND = binge eating disorder – no distress; BED = binge eating disorder; BN = bulimia nervosa; NBO = no-binge-eating/purging obese comparison group; BMI = body mass index; EDE-Q = eating disorder examination - questionnaire; OBE = objective bulimic episodes determined by EDE-Q; BDI = beck depression inventory.

\* All F-ratios significant at  $p < .001$ , df ranged from (3, 777) to (3,881).

Posthoc tests (Scheffe for ANOVAs; Bonferroni for ANCOVAs) indicate significant group differences as follows: a: BED-ND vs. BED; b: BED-ND vs. BN; c: BED-ND vs. NBPO; d: BED vs. BN; e: BED vs. NBPO; f: BN vs. NBPO. ALL indicates that all groups significantly differed.