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Is the diagnostic threshold for bulimia nervosa clinically meaningful?☆

Danielle A.N. Chapa, Brittany K. Bohrer, Kelsie T. Forbush*

University of Kansas, Department of Psychology, 1415 Jayhawk Blvd., Lawrence, KS 66045, United States

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ABSTRACT

The *DSM-5* differentiates full- and sub-threshold bulimia nervosa (BN) according to average weekly frequencies of binge eating and inappropriate compensatory behaviors. This study was the first to evaluate the modified frequency criterion for BN published in the *DSM-5*. The purpose of this study was to test whether community-recruited adults (N = 125; 83.2% women) with current full-threshold (n = 77) or sub-threshold BN (n = 48) differed in comorbid psychopathology and eating disorder (ED) illness duration, symptom severity, and clinical impairment. Participants completed the Clinical Impairment Assessment and participated in semi-structured clinical interviews of ED- and non-ED psychopathology. Differences between the sub- and full-threshold BN groups were assessed using MANOVA and Chi-square analyses. ED illness duration, age-of-onset, body mass index (BMI), alcohol and drug misuse, and the presence of current and lifetime mood or anxiety disorders did not differ between participants with sub- and full-threshold BN. Participants with full-threshold BN had higher levels of clinical impairment and weight concern than those with sub-threshold BN. However, minimal clinically important difference analyses suggested that *statistically* significant differences between participants with sub- and full-threshold BN on clinical impairment and weight concern were not *clinically* significant. In conclusion, sub-threshold BN did not differ from full-threshold BN in clinically meaningful ways. Future studies are needed to identify an improved frequency criterion for BN that better distinguishes individuals in ways that will more validly inform prognosis and effective treatment planning for BN.

1. Introduction

Bulimia nervosa (BN) is characterized by recurrent binge eating (BE) and inappropriate compensatory behaviors (ICBs). The fourth edition of the *Diagnostic and Statistical Manual of Mental Disoders* (*DSM-IV;* American Psychological Association, 1994) required an individual to engage in BE and ICBs at least twice per week (on average) in order to meet full criteria for BN. The frequency criterion in *DSM-5* (American Psychological Association, 2013) was lowered because previous research found that individuals who engaged in BE and ICBs once per week vs. twice per week were more similar than different across a range of demographic and psychiatric variables (Crow, Agras, Halmi, Mitchell, & Kraemer, 2002; Garfinkel et al., 1995; Grilo et al., 2009; Krug et al., 2008; Le Grange et al., 2006; MacDonald, McFarlane, & Olmsted, 2014; Rockert, Kaplan, & Olmsted, 2007; Schmidt et al., 2008; Thomas, Vartanian, & Brownell, 2009; Wilson & Walsh, 1991). According to the current *DSM-5* diagnostic system, individuals who engage in BE and ICBs once per week, on average, are diagnosed with full-threshold BN. If BE and ICBs occur less than once per week, on average, a sub-threshold BN diagnosis can be given. Sub-threshold BN is categorized within a separate diagnostic class from full-threshold BN despite their shared symptoms (i.e., BE and ICBs); for example, sub-threshold BN is categorized within 'other specified' feeding or eating disorders (OSFED). Separate diagnostic classes for sub- and full-threshold BN suggest that the two are qualitatively different disorders. However, to our knowledge, no studies have compared *DSM-5* sub- and full-threshold BN to assess whether the reduced frequency criterion is associated with differences in eating disorder (ED) and non-ED psychopathology and clinical impairment.

The purpose of the current study was to test whether participants with *DSM-5* full- or sub-threshold BN differed significantly from each other on measures of ED- and non-ED-related psychopathology. Given that the *DSM* frequency criterion has not successfully differentiated between sub- and full-threshold BN previously (Crow et al., 2002; Garfinkel et al., 1995; Grilo et al., 2009; MacDonald et al., 2014; Rockert et al., 2007; Schmidt et al., 2008; Wilson & Sysko, 2009), we hypothesized that individuals with *DSM-5* sub- and full-threshold BN would not differ on the presence of current and lifetime mood and anxiety disorders, clinical impairment, alcohol and drug misuse, body mass index (BMI), ED age of onset, and ED illness duration.

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* Corresponding author at: Department of Psychology, Fraser Hall, 1415 Jayhawk Blvd., Lawrence, KS 66045, United States.
E-mail addresses: dchapa@ku.edu (D.A.N. Chapa), bbohrer@ku.edu (B.K. Bohrer), kforbush@ku.edu (K.T. Forbush).

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2. Methods

2.1. Participants and procedure

Participants with full-threshold BN (n = 77) and sub-threshold BN[1] (n = 48) were recruited from a larger ongoing longitudinal study of ED course and outcome [see Forbush, Siew, & Vitevitch, 2016 for details on inclusion and exclusion criteria of the parent study]. For the current study, inclusion criterion included a diagnosis of either sub- or full-threshold BN. Full-threshold BN was defined as meeting all of the *DSM-5* criteria for BN. Individuals with sub-threshold BN engaged in BE and ICBs, but at a lower frequency. By definition, individuals in the sub-threshold BN group met criteria for a full-threshold OSFED (i.e., "bulimia nervosa of low frequency"). Only data from baseline visits were included in the present study.

Participants' mean (*SD*) age was 25.22 (8.94) years and their mean (*SD*) BMI was 26.63 (7.4). Among the entire sample, 23.2% reported a past history of anorexia nervosa, 38.4% reported a past history of binge eating disorder, and 61.6% reported a past history of OSFED. The sample was primarily comprised of women (83.2%; n = 104). Based on self-report data, 74% of participants were White, 14.6% were Asian, 6.5% were African American, 3.3% reported another race or ethnicity, and 1.6% reported that they identify with multiple races. In addition to their self-reported race, 7.2% of the sample also reported that they were Hispanic. There were no statistically significant differences between participants with sub- or full-threshold BN for sex, the proportion of ethnic-racial minority participants, current participation in mental-health services, or current use of prescribed psychiatric medications (see Table 1).

The Institutional Review Board approved all study procedures. Following informed consent, participants completed a series of semi-structured, in-person interviews and self-reports measuring ED- and non-ED psychopathology. Participants' height and weight were measured using a wall-mounted stadiometer and digital scale. Height and weight measurements were used to calculate BMI [BMI = (weight in pounds $*$ 703)/(height in inches^2)]. Three bachelors- and masters-level clinicians conducted the clinical interviews (e.g., the Eating Disorder Examination and others described in section *2.2*) and were supervised during weekly consensus meetings by the second or third author (BB or KF). Interviews were audiotaped (with participant permission) and inter-rater reliabilities [Conger's Kappa for categorical variables and Intraclass Correlations (ICC) for continuous variables] were calculated from 10% of participant interviews using AgreeStat (Advanced Analytics LLC, 2010).

2.2. Measures

The Clinical Impairment Assessment (CIA; Bohn & Fairburn, 2008) is a 16-item self-report used to measure the extent of personal, social, and cognitive impairment related to an ED over the past 28 days. The Eating Disorder Examination (EDE; Cooper & Fairburn, 1987) is a semi-structured interview used to assess weight and shape concern; questions from the Eating Concern and Restraint Subscales were not administered in the parent study. The Structured Clinical Interview for *DSM-IV-TR* Axis I Disorders - Non-patient edition (SCID-I/NP; First, Spitzer, Gibbon, & Williams, 2010) was used to diagnose current and lifetime eating, mood, and anxiety disorders (modules A, D, F, and H). The SCID also assessed BN age-of-onset and illness duration. ED criteria within the SCID were adjusted to be congruent with the *DSM-5*. The Drug Abuse Screening Test (DAST; Skinner, 1982) measured drug misuse (e.g., using drugs for nonmedical reasons) and the Alcohol Use Disorders Identification Test (AUDIT; Reinert & Allen, 2002) measured alcohol misuse (e.g., frequency of alcohol consumption). We selected these dependent variables because they have been included in previous studies comparing sub- and full-threshold BN. Measures were selected based on their established psychometric properties including excellent internal consistency reliability, criterion-related validity, and/or convergent validity.

2.3. Statistical analyses

Data were analyzed using SPSS Version 22 (IBM Corporation, 2011). Missing data were imputed in SAS (SAS Institute, 2013) using maximum likelihood multiple imputation (averaged over 11 imputations) if 15% or less of the individual items within a scale were missing. We conducted a MANOVA with BN type as the independent variable for continuous dependent variables. Chi-square was used to test whether individuals with full- or sub-threshold BN differed in the proportion of current and lifetime mood and anxiety disorders. Estimated effect sizes and effect size confidence intervals for the MANOVA and Chi-square analyses were calculated using the 'compute.es' package in R.

Finally, we calculated the minimal clinically important difference (MCID; Copay, Subach, Glassman, Polly, & Schuler, 2007) to evaluate whether *statistically significant* differences between groups represent *clinically meaningful* differences. An anchor-based MCID score was calculated using the standard error measurement (*SEM*), $SEM = SD_{baseline}[\sqrt{(1-r)}]$, where r is *Cronbach's alpha*. MCID scores calculated from the SEM represent an amount of mean difference between two groups that could occur from measurement error alone. Thus, mean differences that are less than the MCID value could be due to measurement error and are not considered *clinically significant*. Mean differences that exceed the MCID value can be considered *clinically significant*.

3. Results

To adjust for skewness and kurtosis, log + 1 transformations were applied to DAST scores and ED illness duration. MANOVA results did not differ when using transformed versus non-transformed variables. We chose to report the untransformed data to maintain the original scale of each dependent variable. Wilks' Lambda indicated that sub- and full-threshold BN groups were not significantly different from one another, $F(7, 109) = 0.91$, $p = 0.184$. Univariate results indicated that the full-threshold BN group reported significantly higher levels of Weight Concern and clinical impairment than the sub-threshold BN group (see Table 2). However, there were no significant differences between sub- and full-threshold BN groups in terms of drug or alcohol misuse, BMI, age-of-onset, chronicity, or presence of a current or lifetime mood or anxiety disorder (see Table 2). Effect sizes for between-group differences were all small.

Results from MCID analyses found that the value of one SEM was 5.05 for CIA scores and 1.02 for Weight Concern. Comparisons of the observed between-group differences to the appropriate SEM indicated that neither clinical impairment ($M_{difference}$ = 3.96) nor Weight Concern ($M_{difference}$ = 0.49) reached the minimal difference required for effects to be deemed clinically significant.

[1] The *DSM-5* added an "in partial remission" specifier for BN to describe individuals who had a lifetime history of full-threshold BN, but who currently meet only some, but not all, of the criteria for full-threshold BN. Among participants diagnosed with current sub-threshold BN (n = 48), 62.5% (n = 30) had a lifetime history of full-threshold BN. As a supplemental analysis, we tested whether persons with sub-threshold BN who met lifetime criteria for full-threshold BN differed from those who had never met lifetime criteria for full-threshold BN on key study variables. Results indicated that participants in the sub-threshold group who had met lifetime criteria for full-threshold BN had significantly lower levels of alcohol abuse than participants who had never met lifetime criteria for full-threshold BN. However, frequency of ED behaviors, ED illness duration, ED age-of-onset, weight concern, clinical impairment, and drug abuse were not significantly different among participants with sub-threshold BN, regardless of whether or not they had met lifetime criteria for full-threshold BN. Because remission status did not substantially impact levels of ED psychopathology and clinical impairment, we combined participants with or without a lifetime history of full-threshold BN into the sub-threshold group for our study main analyses to maximize power.