Estimating the Prevalence of Binge Eating Disorder in a Community Sample From the United States:
Comparing *DSM-IV-TR* and *DSM-5* Criteria

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ABSTRACT

Objective: To estimate binge eating disorder (BED) prevalence according to *DSM-5* and *DSM-IV-TR* criteria in US adults and to estimate the proportion of individuals meeting *DSM-5* BED criteria who reported being formally diagnosed.

Methods: A representative sample of US adults who participated in the National Health and Wellness Survey were asked to respond to an Internet survey (conducted in October 2013). Assessments included 3-month, 12-month, and lifetime BED prevalence based on *DSM-5* and *DSM-IV-TR* criteria and demographics, psychiatric comorbidities, and self-esteem (Rosenberg Self-Esteem Scale). Descriptive statistics are provided. Prevalence estimates were calculated using poststratification sampling weights.

Results: Of 22,397 respondents, 344 (women, n = 242; men, n = 102) self-reported symptoms consistent with *DSM-5* BED symptom criteria. The 3-month, 12-month, and lifetime *DSM-5* prevalence estimates (95% CIs) projected to the US population were 1.19% (1.04%–1.37%), 1.64% (1.45%–1.85%), and 2.03% (1.83%–2.26%), respectively. The 12-month and lifetime projected *DSM-IV-TR* prevalence estimates were 1.15% (1.00%–1.32%) and 1.52% (1.35%–1.70%), respectively. Of respondents meeting *DSM-5* BED criteria in the past 12 months, 3.2% (11/344) reported receiving a formal diagnosis. Compared with non-BED respondents, respondents meeting *DSM-5* BED criteria in the past 12 months were younger (mean ± SD age = 46.01 ± 14.32 vs 51.59 ± 15.80 years; P < .001), had a higher body mass index (mean ± SD = 33.71 ± 9.36 vs 27.96 ± 6.68 kg/m²; P < .001), and had lower self-esteem (mean ± SD score = 16.47 ± 6.99 vs 23.33 ± 6.06; P < .001).

Conclusions: *DSM-5* BED criteria resulted in higher BED prevalence estimates than with *DSM-IV-TR* criteria. Most BED respondents did not report being formally diagnosed, indicating an unmet need in BED recognition and diagnosis.

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Binge eating disorder (BED), the general symptomatology of which was recognized as early as 1959,[1] was included in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*) as a diagnosis for further study in the early 1990s.[2–4] However, it did not receive official recognition as a distinct eating disorder until its inclusion in *DSM-5* in 2013.[5]

According to *DSM-5* diagnostic criteria for BED (Table 1), binge eating must occur at least once a week for ≥ 3 months. These episodes are characterized by the consumption, in a discrete period of time, of a larger amount of food than is typical for most people under similar circumstances, by a sense of lack of control over eating, and by marked distress about binge eating.[5] Unlike bulimia nervosa (BN) and anorexia nervosa (AN), BED is not associated with recurrent inappropriate compensatory behaviors (eg, purging or excessive exercise).[5] In the *DSM-5*, the binge episode frequency criterion was reduced from the *DSM-IV Text Revision* (*DSM-IV-TR*) criterion of ≥ 2 days per week for ≥ 6 months,[6] but other criteria were unchanged. Therefore, individuals previously not meeting *DSM-IV-TR* criteria may now meet *DSM-5* criteria.

Two large-scale studies assessed BED prevalence using *DSM-IV-TR* criteria.[7,8] The 2001–2003 US National Comorbidity Survey Replication study (N = 9,282) reported 12-month and lifetime BED prevalence estimates of 1.2% and 2.6%, respectively.[7,8] In a series of surveys across 14 countries (N = 24,124), another study reported 12-month and lifetime BED prevalence estimates of 0.8% (range, 0.1%–1.8%) and 1.9% (range, 0.2%–4.7%), respectively.[8] Several studies have reported that BED is associated with increased rates of comorbid psychiatric disorders (eg, mood and anxiety disorders),[7–11] personality disorders (eg, obsessive-compulsive disorder),[12] and psychological features (eg, low self-esteem).[12,13]

Although studies have estimated the epidemiologic implications of the updated *DSM-5* BED criteria,[14–16] no large-scale surveys have used these criteria to assess BED prevalence or the demographic and clinical profiles of afflicted individuals.[17] This study estimated and compared BED prevalence based on *DSM-5* and *DSM-IV-TR* criteria in a representative US adult population. It also determined the proportion of individuals meeting *DSM-5* BED criteria who reported receiving a formal diagnosis of BED. The demographic and clinical characteristics and self-esteem levels of respondents who met *DSM-5* criteria for BED were also compared with those of respondents without BED.

Clinical Points

- Twelve-month and lifetime binge eating disorder (BED) prevalence estimates based on *DSM-5* criteria (1.64% and 2.03%, respectively) were higher than estimates based on *DSM-IV-TR* criteria (1.15% and 1.52%, respectively).

- Among survey respondents who met *DSM-5* criteria for BED, only 3.2% had ever received a formal diagnosis from a health care provider.

- Survey respondents meeting *DSM-5* criteria for BED were significantly more likely to report lifetime depression (adjusted odds ratio [OR] = 3.82), lifetime anxiety (adjusted OR = 3.17), lifetime bipolar disorder (adjusted OR = 3.92), and attention-deficit/hyperactivity disorder in the last 6 months (adjusted OR = 8.24) than respondents who did not meet diagnostic criteria for BED after controlling for age, sex, and body mass index.

Table 1. Criteria for BED Diagnosis Based on the *DSM-5* and *DSM-IV-TR* in Survey Respondents

Criterion

A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:
  1. Eating, in a discrete period of time (eg, within any 2-hour period), an amount of food that is definitely larger than (what*) most people would eat in a similar period of time under similar circumstances.
  2. A sense of lack of control over eating during the episode (eg, a feeling that one cannot stop eating or control what or how much one is eating).
B. The binge eating episodes are associated with 3 or more of the following:
  1. Eating much more rapidly than normal.
  2. Eating until feeling uncomfortably full.
  3. Eating large amounts of food when not feeling physically hungry.
  4. Eating alone because of (feeling*/being†) embarrassed by how much one is eating.
  5. Feeling disgusted with oneself, depressed, or very guilty (afterward*/ after overeating†).
C. Marked distress regarding binge eating is present.
D. The binge eating occurs, on average, at least (once a week for 3 months*/2 days a week for 6 months†).
E. The binge eating is not associated with the (recurrent*/regular†) use of inappropriate compensatory behavior (as in bulimia nervosa*/ [eg, purging, fasting, excessive exercise†]) and does not occur exclusively during the course of bulimia nervosa or anorexia nervosa.

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*Word use in *DSM-5*.
†Word use in *DSM-IV-TR*.
Abbreviations: BED = binge eating disorder; *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition; *DSM-IV-TR* = *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision.

METHODS

Sample and Procedures

The National Health and Wellness Survey (NHWS) is a self-administered Internet survey completed by approximately 75,000 US adults each year, which is sponsored by Kantar Health (Princeton, New Jersey). Potential NHWS respondents are identified through the general panel of Lightspeed Research (Warren, New Jersey). As previously described,[18] adults (≥ 18 years of age) in the United States are eligible for this general panel and can join by responding to advertisements in e-newsletters and online banner advertisements. The demographic profile of NHWS respondents approximates the Current Population Survey of the US Census Bureau.[19,20] Disease prevalence estimates of the NHWS are similar to those of the National Health Interview Survey.[19]

Among respondents to the 2012 NHWS (N = 71,157 from January 2012–December 2012) and 2013 NHWS (N = 75,000 from January 2013–September 2013), 69,972 were contacted to participate in this Internet survey (Validate Attitudes and Lifestyle Issues in Depression, ADHD and Troubles with Eating [VALIDATE]). Participation was cutoff when the desired sample size was met. The survey was completed October 9–29, 2013. It included questions assessing *DSM-5* and *DSM-IV-TR* criteria for BED and questions related to demographic and clinical profiles, general health, self-esteem, and diagnosed psychiatric disorders. For their participation in the study, respondents were compensated with "panel points," which could be accumulated and exchanged for consumer goods (eg, electronics, clothing).

A stratified random sample framework was implemented to ensure representation across sex, age, and ethnicity. The protocol for the survey was approved by an institutional review board (Sterling IRB #4509) before initiation.

Measures

Self-reported demographics, psychiatric symptoms, and psychological features were collected. All respondents were also asked whether they had received a diagnosis for several psychiatric and medical conditions, including attention-deficit/hyperactivity disorder (ADHD), anxiety, bipolar disorder, and depression.

Responses to questions representing *DSM-5* or *DSM-IV-TR* BED symptom criteria (Supplementary eTable 1) were used to assess whether individuals could be considered to meet diagnostic criteria for BED across 3-month, 12-month, and "ever" time frames to capture the respective prevalence estimates (3-month prevalence was not assessed for *DSM-IV-TR* because the duration criterion was 6 months in *DSM-IV-TR*). For the duration criterion, respondents were asked how long they had experienced BED symptoms (< 1, 1–2, 3–4, 5–6, or 7–12 months). Those responding 5–6 or 7–12 months were classified as meeting the *DSM-IV-TR* criterion. Consistent with *DSM-IV-TR* and *DSM-5* criteria, respondents who self-reported receiving a BN or AN diagnosis were not considered to meet BED symptom criteria.

Self-esteem was assessed with the Rosenberg Self-Esteem Scale (RSE), a 10-item self-report scale measuring both positive and negative feelings about oneself.[21] The RSE has acceptable reliability and validity in measuring global self-worth in adult populations.[22]

The Patient Health Questionnaire-9 (PHQ-9)[23] assessed major depressive disorder (MDD) symptoms in the past 2 weeks using 2 scoring methods. For each of the PHQ-9 items, scores range from 0 ("not at all") to 3 ("nearly every day"). When scored as a continuous variable, PHQ-9

total score ranges from 0 to 27 (0–4 = minimal depression; 5–9 = mild depression; 10–14 = moderate depression; 15–19 = moderately severe depression; 20–27 = severe depression).[23] When each item is scored in a dichotomized fashion,[23] PHQ-9 total score ranges from 0 to 9. Individuals are classified as "consider major depressive disorder" if their total score is ≥ 5 and they report "little interest or pleasure in doing things" and/or "feeling down, depressed, or hopeless" on "more than half the days" or "nearly every day." The Mood Disorder Questionnaire (MDQ)[24] was administered as part of the NHWS. Respondents were omitted from being categorized as having MDD via the PHQ-9 if they screened positive for bipolar disorder on the MDQ or reported a prior diagnosis of bipolar disorder or schizophrenia.

Respondents were assessed for ADHD in the past 6 months using the 18-item Adult ADHD Self-Report Scale (ASRS) version 1.1.[25] Each item is scored on 5-point Likert scales that range from "never" to "very often."[25,26] For assessment of a *DSM-5* ADHD diagnosis, all items were scored dichotomously (1 or 0) and the total score was obtained by summing the individual item scores.[26] Scores ≥ 5 among the 9 inattentive symptoms or the 9 hyperactive/impulsive symptoms were considered to fulfill *DSM-5* ADHD symptom criteria.

### Data Analysis and Statistics

Prevalence estimates for BED are based on the full sample and calculated using poststratification sampling weights based on population totals for joint strata of sex (male/female), age (18–29, 30–39, 40–49, 50–64, ≥ 65 years), and race (white, black, other) derived from the September 2013 Current Population Survey.[27] Prevalence estimates are provided as percentages with 95% CI calculated using Taylor Series linearization. Significance testing for comparisons of prevalence estimates based on *DSM-IV-TR* and *DSM-5* criteria were not conducted because the statistical comparison of the estimates would violate the assumption of independence.

Individuals were classified as meeting criteria for a *DSM-5* BED diagnosis in the past 12 months (referred to herein as *BED respondents*) or as not meeting those criteria (referred to herein as *non-BED respondents*). Respondents who self-reported a lifetime diagnosis of AN or BN were excluded from the BED respondent group. These criteria for the categorization of BED respondents and non-BED respondents were used because they are generally in keeping with *DSM-5* diagnostic criteria for BED, hence providing the most conservative BED prevalence estimate.

Non-BED respondents may or may not have reported periods during which they ate large amounts of food (Criterion A1); however, these periods were not accompanied by loss of control over eating (Criterion A2). Respondents were excluded from the bivariate analyses (BED respondents vs non-BED respondents) if they reported binge eating in the past 12 months (periods when large amounts of food were consumed [Criterion A1] and feelings of loss of control were present [Criterion A2]), but other BED criteria were not met.

Score distributions on the RSE and PHQ-9 and psychiatric comorbidity prevalence among BED respondents were

Figure 1. Summary of Respondent Classification
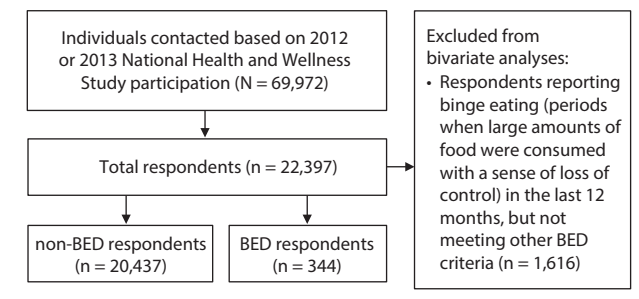
compared with those of non-BED respondents using *t* tests for continuous variables (least significant difference test with Bonferroni corrections to adjust for multiple comparisons) or χ² tests for categorical variables. Unadjusted odds ratios for psychiatric comorbidities were calculated from 2 × 2 frequencies tables (BED vs non-BED respondents by comorbidity vs no comorbidity). Adjusted odds ratios were calculated via logistic regression models controlling for age, sex, and body mass index (BMI).

RESULTS

Respondent Classification and Demographics

The survey was completed by 22,397 respondents within 3 weeks or less of being invited to participate (Figure 1), all of whom were included in the analyses. Based on the number of e-mail invitations sent, the participation rate was 32%. Among all respondents, 344 (women, n = 242; men, n = 102) met the *DSM-5* BED criteria in the past 12 months (BED respondents); 20,437 individuals did not meet these criteria in the past 12 months (non-BED respondents). The remaining 1,616 respondents were excluded because they met some, but not all, BED criteria in the past 12 months. Of respondents who self-reported a lifetime diagnosis of AN (n = 144) or BN (n = 104), 108 who self-reported AN and 58 who self-reported BN were included in the non-BED respondent group. The remainder (AN, n = 36; BN, n = 46) were part of the overall 1,616 respondents who were excluded for meeting some, but not all, BED criteria in the past 12 months.

In the overall population, most respondents were female (54.4% [12,182/22,397]), white (82.67% [18,515/22,397]), and ≥ 40 years old (72.84% [16,315/22,397]). Mean ± SD age was 51.12 ± 15.83 years. BED respondents were significantly younger than non-BED respondents (46.01 ± 14.32 vs 51.59 ± 15.80 years; *P* < .001). Compared with non-BED respondents, more BED respondents were female (53.7% [10,968/20,437] vs 70.3% [242/344]). The majority of respondents had a BMI ≥ 25 kg/m² (62.9% [14,096/22,397]), and nearly one-third had a BMI ≥ 30 kg/m² (31.2% [6,991/22,397]). Mean ± SD BMI was 28.27 ± 6.91 kg/m² overall and was significantly greater in BED respondents than non-BED respondents (33.71 ± 9.36 vs 27.96 ± 6.68; *P* < .001). The overall demographic profile of survey respondents was roughly comparable to the general US adult population based on the September 2013 Current Population Survey.[27]

Table 2. Projected Prevalence of BED Based on *DSM-5* and *DSM-IV-TR* Diagnostic Criteria

| | | Projected Prevalence[a] | | | | |
| | | *DSM-5* | | | *DSM-IV-TR* | |
Subpopulation	Respondents, n (%)	3-Month, % (95% CI)	12-Month, % (95% CI)	Lifetime, % (95% CI)	12-Month, % (95% CI)	Lifetime, % (95% CI)
Overall	22,397 (100)	1.19 (1.04–1.37)	1.64 (1.45–1.85)	2.03 (1.83–2.26)	1.15 (1.00–1.32)	1.52 (1.35–1.70)
Sex						
Female	12,182 (54.39)	1.60 (1.38–1.85)	2.00 (1.76–2.28)	2.61 (2.34–2.92)	1.53 (1.32–1.77)	2.07 (1.83–2.35)
Male	10,215 (45.61)	0.76 (0.56–1.03)	1.24 (0.97–1.59)	1.41 (1.13–1.77)	0.75 (0.55–1.01)	0.92 (0.71–1.19)
Race						
Black	1,983 (8.85)	0.71 (0.43–1.18)	1.51 (1.04–2.19)	1.67 (1.18–2.37)	0.94 (0.59–1.49)	1.10 (0.72–1.67)
Other	1,899 (8.48)	0.59 (0.34–1.02)	1.29 (0.87–1.91)	1.69 (1.20–2.36)	0.87 (0.54–1.38)	1.26 (0.86–1.85)
White	18,515 (82.67)	1.33 (1.15–1.54)	1.69 (1.48–1.94)	2.13 (1.89–2.39)	1.22 (1.05–1.42)	1.61 (1.42–1.83)
Age, y						
18–29	2,423 (10.82)	1.49 (1.04–2.13)	2.15 (1.57–2.93)	2.32 (1.73–3.11)	1.28 (0.86–1.89)	1.39 (0.96–2.01)
30–39	3,659 (16.34)	1.26 (0.96–1.66)	1.92 (1.52–2.42)	2.32 (1.89–2.86)	1.35 (1.03–1.77)	1.74 (1.37–2.19)
40–49	4,654 (20.78)	1.22 (0.94–1.58)	1.68 (1.35–2.10)	2.09 (1.72–2.54)	1.23 (0.95–1.58)	1.62 (1.30–2.01)
50–64	5,823 (26.00)	1.30 (1.02–1.64)	1.60 (1.29–1.97)	2.22 (1.86–2.65)	1.23 (0.97–1.56)	1.79 (1.47–2.18)
≥65	5,838 (26.07)	0.60 (0.43–0.84)	0.79 (0.59–1.06)	1.13 (0.88–1.44)	0.65 (0.47–0.91)	0.99 (0.76–1.29)
BMI, kg/m²						
Declined to answer	785 (3.50)	0.96 (0.49–1.86)	0.89 (0.46–1.73)	1.22 (0.69–2.17)	0.81 (0.40–1.64)	1.14 (0.63–2.08)
<18	272 (1.21)	0.79 (0.25–2.43)	0.78 (0.25–2.40)	0.78 (0.25–2.40)	0.54 (0.13–2.13)	0.54 (0.13–2.13)
18–24	7,244 (32.34)	0.61 (0.41–0.91)	0.84 (0.59–1.20)	1.23 (0.94–1.61)	0.48 (0.30–0.77)	0.78 (0.56–1.08)
25–29	7,105 (31.72)	0.76 (0.58–1.01)	1.32 (1.05–1.67)	1.69 (1.39–2.06)	0.81 (0.61–1.06)	1.18 (0.94–1.47)
30–34	3,847 (17.18)	1.80 (1.32–2.46)	2.29 (1.73–3.01)	2.64 (2.06–3.38)	1.70 (1.26–2.29)	2.02 (1.55–2.62)
≥35	3,144 (14.04)	2.99 (2.45–3.64)	3.86 (3.22–4.62)	4.47 (3.78–5.28)	3.14 (2.57–3.84)	3.75 (3.12–4.50)

[a]Projected estimates based on US adult demographic data from the 2013 Current Population Survey.[27]
Abbreviations: BED = binge eating disorder; BMI = body mass index; *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition; *DSM-IV-TR* = *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision.

Prevalence of Binge Eating Disorder

Prevalence estimates (95% CI) for BED projected to the US adult population based on *DSM-5* and *DSM-IV-TR* criteria are summarized in Table 2. The overall 3-month, 12-month, and lifetime prevalence estimates (95% CIs) based on *DSM-5* criteria were 1.19% (1.04%–1.37%), 1.64% (1.45%–1.85%), and 2.03% (1.83%–2.26%), respectively. The 12-month and lifetime projected prevalence estimates using *DSM-IV-TR* criteria were 1.15% (1.00%–1.32%) and 1.52% (1.35%–1.70%), respectively (Table 2).

Among BED respondents, a minority (11 [3.2%]) reported ever being diagnosed with BED by a health care provider.

Rosenberg Self-Esteem Scale

Among BED respondents, 34.9% (120/344) met criteria for low self-esteem (based on RSE scores < 15) compared with 8.7% (1,778/20,437) of non-BED respondents (Figure 2A and 2B). Mean ± SD RSE total scores were 16.47 ± 6.99 in BED respondents and 23.33 ± 6.06 in non-BED respondents (*P* < .001).

Patient Health Questionnaire-9

Mean ± SD PHQ-9 total score based on continuous scoring was 11.99 ± 7.27 in BED respondents and 3.19 ± 4.59 in non-BED respondents (*P* < .001). Based on dichotomized PHQ-9 scoring, 5.8% [1,295/22,397] of all respondents met criteria for possible MDD (BED respondents: 31.1% [107/344]; non-BED: 4.6% [948/20,437]) (Figure 2C and 2D).

For BED respondents meeting criteria for MDD, the mean ± SD age at onset for BED symptoms was 30.55 ± 16.49 years (women, 30.61 ± 15.31; men, 30.46 ± 18.29) and for depressive symptoms was 35.01 ± 15.64 years (women, 33.93 ± 13.93; men, 36.58 ± 17.91). Based on the difference between the respondents' year of birth and the year in which symptoms were first experienced, 44.8% (39/87) of respondents with both BED and MDD symptoms reported that the age at BED symptom onset was earlier than the age at MDD symptom onset, and 25.3% (22/87) reported that the age at MDD symptom onset was earlier than at BED symptom onset. In the remaining respondents, BED and MDD age at symptom onset coincided.

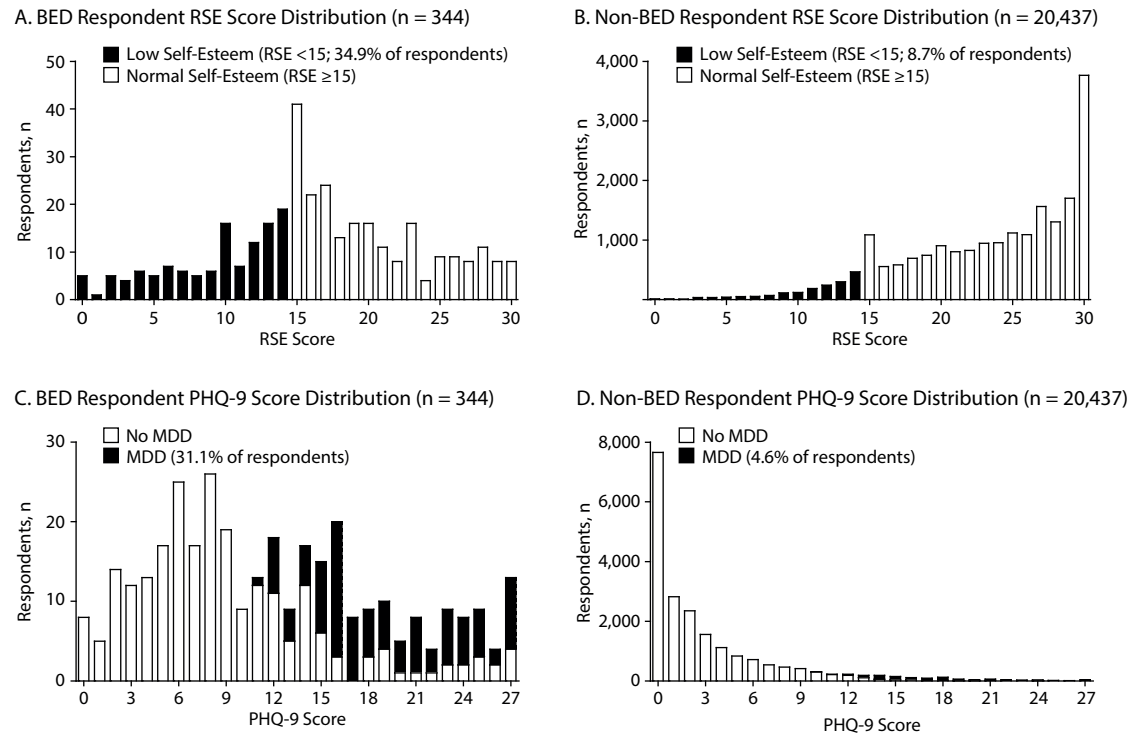## Comorbidities Associated With Binge Eating Disorder

Lifetime psychiatric comorbidity prevalence based on self-report of having been diagnosed with a specific disorder was higher among BED respondents than non-BED respondents for depression (52.6% [181/344] vs 17.2% [3,518/20,437]; *P* < .001), anxiety (43.3% [149/344] vs 15.2% [3,098/20,437]; *P* < .001), and bipolar disorder (10.5% [36/344] vs 1.7% [356/20,437]; *P* < .001). A total of 41.3% (142/344) of BED respondents met criteria for comorbid ADHD in the last 6 months compared with 6.9% (1,400/20,437) of non-BED respondents. Adjusted odds ratios (BED relative to non-BED respondents) for these comorbidities were lower than unadjusted odds ratios, but they remained significant after controlling for age, sex, and BMI (Table 3).

DISCUSSION

This study is the first to estimate BED prevalence using *DSM-5* criteria in a representative population of US adults. The 12-month prevalence of BED was 1.64% based on *DSM-5* criteria and 1.15% based on *DSM-IV-TR* criteria.

Figure 2. Rosenberg Self-Esteem Scale (RSE)[a] and Patient Health Questionnaire-9 (PHQ-9)[b] Score Distribution in BED Respondents and Non-BED Respondents

A. BED Respondent RSE Score Distribution (n = 344)
- Low Self-Esteem (RSE <15; 34.9% of respondents)
- Normal Self-Esteem (RSE ≥15)

B. Non-BED Respondent RSE Score Distribution (n = 20,437)
- Low Self-Esteem (RSE <15; 8.7% of respondents)
- Normal Self-Esteem (RSE ≥15)

C. BED Respondent PHQ-9 Score Distribution (n = 344)
- No MDD
- MDD (31.1% of respondents)

D. Non-BED Respondent PHQ-9 Score Distribution (n = 20,437)
- No MDD
- MDD (4.6% of respondents)

[a]On the RSE, higher scores represent higher self-esteem; respondents with scores < 15 (low self-esteem) are shown in black.
[b]On the PHQ-9, higher scores represent more severe depressive symptoms; respondents classified as having MDD in the last 2 weeks are shown in black. Several respondents were omitted from being categorized as having MDD via PHQ-9 scoring because they screened positive for bipolar disorder on the Mood Disorders Questionnaire (non-BED [n = 5], BED [n = 0]) or because they reported a diagnosis of bipolar disorder (non-BED [n = 356], BED [n = 36]) or schizophrenia (non-BED [n = 57], BED [n = 6]).
Abbreviations: BED = binge eating disorder; DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; MDD = major depressive disorder.

Lifetime prevalence was 2.03% based on DSM-5 criteria and 1.52% based on DSM-IV-TR criteria. These changes are attributable to increases in the estimated prevalence of BED in women and men (from 1.53% to 2.00% and from 0.75% to 1.24%, respectively, for 12-month prevalence). Hudson et al[14] previously estimated that DSM-5 criteria would increase lifetime BED prevalence in the United States from 3.5% to 3.6% in women and from 2.0% to 2.1% in men. However, Trace et al[15] estimated that lifetime prevalence in women would double when the BED frequency and duration criteria shifted from ≥ 8 times per month for 6 months (approximate DSM-IV-TR criteria) to ≥ 4 times per month for 3 months (approximate DSM-5 criteria). These discrepancies in prevalence estimates and in the changes associated with the DSM-5 criteria may partially be due to differences in study populations and in the methods used to estimate prevalence. Hudson et al[14] included individuals aged 18 to 70 years who were first-degree relatives of an individual with BED or of an overweight individual without BED and gathered data by face-to-face or telephone interviews via trained psychiatrist interviewers. Trace et al[15] included only female twins aged 20 to 47 years and gathered data via telephone or Internet surveys. Only the current study used a population that is representative of the general US population.

Table 3. Unadjusted and Adjusted Odds Ratios for Comorbidities Associated With Binge Eating Disorder

Comorbidity	Unadjusted Odds Ratio (95% CI)	P Value	Adjusted Odds Ratio (95% CI)[a]	P Value
ADHD[b]	9.56 (7.66–11.93)	<.001	8.24 (6.56–10.37)	<.001
Anxiety	4.18 (3.35–5.20)	<.001	3.17 (2.53–3.97)	<.001
Bipolar disorder	6.15 (4.23–8.95)	<.001	3.92 (2.65–5.80)	<.001
Depression (self-reported diagnosis)[c]	5.15 (4.15–6.41)	<.001	3.82 (3.06–4.78)	<.001
Depression (PHQ-9)[d]	9.54 (7.50–12.13)	<.001	7.42 (5.78–9.54)	<.001

[a]Factors for adjusted odds ratios included age, sex, and body mass index.
[b]Assessed as having ADHD by the Adult ADHD Self-Report Scale.
[c]Based on self-report of having been diagnosed by a health care provider.
[d]Assessed as having MDD in the last 2 weeks by the 9-Item Patient Health Questionnaire.
Abbreviations: ADHD = attention-deficit/hyperactivity disorder, MDD = major depressive disorder, PHQ-9 = 9-Item Patient Health Questionnaire.

The vast majority of BED respondents (96.8%) had not been formally diagnosed with BED by a health care provider. This may be due to the fact that BED was not a distinct disorder in DSM-IV-TR[6] and would have been diagnosed as eating disorder not otherwise specified. Nonetheless, this low diagnosis rate emphasizes the need to improve awareness and recognition of BED among patients and health care providers, including primary care physicians. Given that

so few individuals were formally diagnosed with BED, a limitation of this study is that it was not possible to conduct comparative statistical analyses to assess differences between these individuals and those meeting BED diagnostic criteria who had not received a formal BED diagnosis. However, in future studies, it would be informative to more closely examine the clinical characteristics of these individuals, including determining differences in their severity of illness.

The reported 12-month *DSM-IV-TR* prevalence estimate (1.15%) is roughly comparable to the 12-month *DSM-IV-TR* US estimate reported by Hudson et al (1.2%)[7] and higher than the multinational estimate reported by Kessler et al (0.8%),[8] which included the US estimate of Hudson et al.[7] The lifetime prevalence in the current study (1.52%) was lower than the lifetime prevalence reported by Hudson et al and Kessler et al (2.6% and 1.9%, respectively).[7,8] These discrepancies may also be attributable to different methods and operational definitions. The present study used an Internet survey, used self-reported symptom assessment, and directly asked about "loss of control." In contrast, Hudson et al[7] and Kessler et al[8] used face-to-face semistructured interviews and indirect measures of loss of control based on questions from the World Health Organization Composite International Diagnostic Interview. Furthermore, Hudson et al[7] and Kessler et al[8] asked whether individuals experienced 3 months of symptoms as opposed to the 6-month minimum required by *DSM-IV-TR* diagnostic criteria. As such, individuals experiencing symptoms for > 3 months but < 6 months were classified as meeting *DSM-IV-TR* BED criteria.

BED respondents also reported more psychiatric comorbidities than non-BED respondents; this statistically significant association remained after controlling for demographic factors. These findings are consistent with the published literature, which indicates that approximately 30%–80% of individuals who met *DSM-IV-TR* criteria for BED had lifetime comorbid mood or anxiety disorders.[7–9,11,13,28] Similarly, BED respondents reported lower self-esteem compared with non-BED respondents, which is also consistent with previous reports.[13] Although beyond the scope of the current study, in the future it will be important to examine any symptomatic or clinical differences between those individuals who meet criteria for *DSM-5*–defined BED and *DSM-IV-TR*–defined BED.

The key strength of this study is that it used a large, representative sample of US adults with respect to age, sex, and race/ethnicity. To our knowledge, no other study to date has assessed *DSM-5* diagnostic criteria for BED in such a large nonclinical sample. Although direct comparisons of NHWS participants who responded to the survey to those who did not respond were not made in the current study, the overall NHWS population and respondents to the current study are both representative of the general US population.

A limitation of this study was that all survey data were self-reported. Consequently, BED diagnoses and associated psychiatric comorbidities cannot be clinically confirmed, and potential biases that can be inherently associated with self-reported measures, including both overestimation and underestimation, need to be considered. Additionally, because there is no validated screener for BED, self-reported BED symptoms were assessed using only survey questions based on the *DSM-5* and *DSM-IV-TR* symptom criteria (Supplementary eTable 1), and formal psychiatric validation of the survey questions relative to structured clinical interviews was not performed. As such, Criterion E (exclusion for recurrent use of compensatory behavior) was operationalized as having self-reported a lifetime diagnosis of BN or AN. However, few respondents were identified as having BN or AN in the current study. Further, whether binge eating occurred in such respondents outside of the course of BN or AN or whether compensatory behavior occurred in these respondents was not assessed. Furthermore, non–symptom-based criteria (eg, functional impairment) were not employed in this analysis. In future studies, it would be of interest to conduct sensitivity analyses, including those with lifetime AN or BN, or in those meeting some but not all BED criteria.

The calculated participation rate was 32%, which may limit the generalizability of these findings. It is important to note that this level of participation may be an underestimation of the true rate. The participation rate reported in the current study is based on the number of invitations sent via e-mail, and the authors do not know how many invitees received the e-mail request because a proportion of the requests may have been automatically filtered by e-mail programs (eg, sent to spam or junk mail folders).[29] If it were possible to calculate how many invitees actually opened the invitation, the overall participation rate may have been higher. Additionally, the current study recruited participants by sending a large number of survey invitations to potential respondents and then ended the ability to participate once the desired sample size was reached. Invitees attempting to participate after the desired sample size was reached were told the survey was no longer available. This method has the advantage of recruiting a large number of respondents in a short time. However, a consequence of this approach compared with an approach in which a smaller number of participants are recruited and allowed many weeks or months to respond is that traditional response rate calculations (ie, responses received divided by total invitations sent) will be lower than what might be expected. If recruitment were not cut off when the desired sample size was reached, and more time were allotted for those invited to respond, the participation rate for this study would likely have been higher than the rate reported in this article and perhaps closer to what would typically be expected of this kind of study. Importantly, the participation rate observed in this study is roughly comparable to that reported in a meta-analysis of Internet-based surveys[30] and of a cell phone–based study from the Centers for Disease Control and Prevention–assisted health data collection project.[31] Furthermore, the percentages of respondents with obesity and with MDD (per the PHQ-9) in this study are similar to national estimates of obesity and depression,[32,33] suggesting the current sample was representative of the overall population.

In summary, the 12-month BED prevalence estimate based on *DSM-5* criteria in the current study was 1.64%

(2.00% and 1.24% in women and men, respectively). As expected, this estimate was higher than the estimate based on *DSM-IV-TR* criteria (1.15%), owing to the reduction in the duration and frequency criteria for binge eating episodes. The increase was particularly pronounced in men. Consistent with previous reports,[7–9,11,13,28] higher psychiatric comorbidity rates were associated with BED in this study. Importantly, approximately 97% of BED respondents had never received a formal diagnosis of BED from a health care provider. However, BED is a new diagnosis in *DSM-5,* so the opportunity for physicians to make the diagnosis has been limited, which could partially account for the low level of diagnosis in study respondents. This low rate of diagnosis emphasizes the need to improve awareness and recognition of BED among patients and health care providers.

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Supplementary material follows this article.

Supplementary Material

List of Supplementary Material for the article

1. **eTable 1**   Sample Survey Questions Related to *DSM-5* BED Diagnostic Criteria

Disclaimer
This Supplementary Material has been provided by the author(s) as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.

Supplementary eTable1. Sample Survey Questions Related to *DSM-5* BED Diagnostic Criteria*

Question	Response
During the past 3 months, were there times you ate an amount of food within 2 hours that was definitely larger than most people would eat in a similar period of time under similar circumstances?	- Yes - No
Considering the times in the past 3 months when you ate an unusually large amount of food, did you feel that you could not stop eating or control what or how much you were eating?	- Yes - No
Thinking about past 3 months, how long have these periods of eating unusually large amounts of food and feeling that your eating was out of control been occurring?	- Less than 1 month 1 month 2 months 3 months
You previously answered that in the past 3 months you ate unusually large amounts of food and felt that your eating was out of control. During the weeks that you ate in this manner (i.e. ate unusually large amounts and felt out of control), how many times per week did you do so?	- Less than once a week 1 day per week 2-3 days per week 4-5 days per week 6-7 days per week
During the past 3 months, how upset were you by the feeling that you couldn't stop eating or control what or how much you were eating?	- Not at all - Slightly - Moderately - Greatly - Extremely
Considering the time(s) in the past 3 months you ate an unusually large amounts of food and felt that your eating was out of control, did you also experience any of the following?	- Yes or No for each of the following: - Feeling disgusted with yourself, depressed, or very guilty after eating - Eating much more rapidly than normal - Eating alone because you feel embarrassed about how much you are eating - Eating large amounts of food when not feeling physically hungry - Eating until feeling uncomfortably full

*Similar questions were asked for other timeframes as well.