EMPIRICAL ARTICLE

Eating Behavior and Eating Disorders in Adults Before Bariatric Surgery

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ABSTRACT

Objective: To describe eating patterns, prevalence of problematic eating behaviors, and determine factors associated with binge eating disorder (BED), before bariatric surgery.

Method: Before surgery, 2,266 participants (median age 46 years; 78.6% female; 86.9% white; median body mass index 45.9 kg/m^2) of the Longitudinal Assessment of Bariatric Surgery-2 (LABS-2) study completed eating behavior survey items in the self-administered LABS-2 Behavior form. Other measures included the Alcohol Use Disorder Identification Test, the LABS-2 Psychiatric and Emotional Test Survey, the Beck Depression Inventory, the Interpersonal Support Evaluation List-12, the Short Form-36 Health Survey, and Impact of Weight Quality of Life-Lite Survey.

Results: The majority (92.1%) of participants reported eating dinner regularly, whereas just over half (54.0%) reported eating breakfast regularly. Half of the participants reported eating at least four meals/week at restaurants; two meals/week were fast food. Loss of control eating was reported by 43.4%, night eating syndrome by 17.7%; 15.7% satisfied criteria for binge eating disorder (BED), 2% for bulimia nervosa. Factors that independently increased the odds of BED were being a college graduate, eating more times per day, taking medication for psychiatric or emotional problems, and having symptoms of alcohol use disorder, lower self-esteem and greater depressive symptoms.

Discussion: Before undergoing bariatric surgery a substantial proportion of patients report problematic eating behaviors. Several factors associated with BED were identified, most suggesting other mental health problems, including higher levels of depressive symptomotology. The strengths of this study include the large sample size, the multi-center design and use of standardized assessment practices. © 2014 Wiley Periodicals, Inc.

Keywords: Roux-en-Y gastric bypass; laparoscopic gastric banding; binge eating; binge eating disorder; night eating syndrome; nocturnal eating; evening hyperphagia

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Introduction

The prevalence of obesity has reached epidemic proportions worldwide.[1] This has been associated with increasing concerns regarding various obesity-related comorbidities, including diabetes, hyperlipidemia, asthma, and hypertension.[2–5] Nonsurgical interventions for severe obesity result in modest weight loss at best, frequently not long lasting. Thus, bariatric surgery, which generally results in substantial weight loss that is relatively well maintained at long-term follow-up, has emerged as a leading treatment.[6,7] However, a subgroup of patients fails to lose or regains a substantial amount of weight, or experience other adverse outcomes, including adverse psychosocial outcomes.[8] Some of these problems may relate to problematic eating behaviors that are present before bariatric surgery. The purpose of this article is to present data on self-reported eating behavior, including problematic eating behaviors

and eating disorders in a large cohort of individuals before surgery, and to examine which participant characteristics are associated with binge eating disorder (BED), the most common eating disorder.[8]

An examination of eating behaviors, including meal patterns and problematic eating disorders, is important in understanding behaviors associated with developing severe obesity and identifying behaviors that may need to be addressed as part of the assessment before surgery. Previous research suggests that lower meal frequency per day is related to higher body mass index (BMI),[9] with skipping breakfast in some literature associated with increased prevalence of obesity.[10] Eating out more frequently is also associated with obesity, higher body fatness and higher BMI,[9–15] as it is a risk factor for higher energy and fat intake and lower micronutrient intake.[11] Consuming fast food meals, in particular, is linked not only to higher calorie and saturated fat intake, but also higher intake of sugary soft drinks, and lower fruit, vegetable and milk intake.[15–18]

BED is one of the most common eating disorders in the general population.[19] It is defined as consumption of an objectively large amount of food in a discrete period of time (i.e., 2 h), with an accompanying sense of loss of control over eating and subsequent distress.[20] The World Mental Health Survey Initiative indicates a U.S. prevalence rate of $1.2 \pm 0.2\%$.[21] While prevalence estimates of BED in the bariatric surgery population vary, in part due to differences in assessment methods, they generally have been much higher[22–24] compared to the general population. This finding is in line with population-based survey data in which odds of BED increased with BMI.[22] However, results from a recent study by Jones-Corneille et al.[25] suggest that standard correlates of BED (i.e., female sex, younger age, less education and BMI) may not apply within this unique population. In this study ($n = 105$), the presence of BED among bariatric surgery candidates was associated with higher rates of other forms of psychopathology, including depression and anxiety disorders, as well as lower self-esteem, but not demographic variables or BMI.[25]

Pre-surgery BED has not been consistently predictive of the amount of weight loss after surgery.[23–32] However, many patients who develop problems with binge eating or loss of control eating after surgery have a history of pre-surgery BED, and those individuals who develop such problems experience less weight loss or more weight regain.[33] Thus identifying individuals who engage in such behaviors before surgery is important.

This article reports data from the Longitudinal Assessment of Bariatric Surgery-2 (LABS-2). Using data from the preoperative assessment, the aims of the current analysis are to:

1. Describe eating patterns, including frequency and type of meals;
2. Assess the prevalence of problematic eating behaviors and eating disorders;
3. Compare patients who have BED to those who do not have BED; and
4. Determine which factors independently increase the odds of having BED.

This information should help clinicians recognize the problematic eating behaviors of preoperative patients, because such behaviors may be potential targets for intervention by the bariatric team.

Method

The Longitudinal Assessment of Bariatric Surgery-2 (LABS-2) is an ongoing multi-center study designed to assess the risks and benefits of bariatric surgery.[34,35] The cohort includes 2,458 individuals at least 18 years of age who underwent their first bariatric surgical procedure (primarily Roux-en-Y gastric bypass or laparoscopic adjustable gastric band, but also sleeve gastrectomy, biliopancreatic diversion with duodenal switch, or banded gastric bypass). Surgery was completed by a LABS-certified surgeon at one of 10 participating hospitals across the United States. All participants were recruited between February 2006 and February 2009, resulting in a cohort of 2,458. All participants provided an Institutional Review Board approved consent.

The methods for data collection and baseline health status for the LABS-2 cohort have been published previously.[34,35] The baseline assessment was conducted within 30 days before participants' scheduled surgery date. Eating behaviors and psychological measures were collected independently of surgical care.

The study (NCT00465829) is registered at www.clinicaltrials.gov.

Assessment of Eating Behaviors

The self-administered LABS-2 Behavior Form, available on line at www.niddklabs.org, includes a section on eating behaviors. The survey development team consisted of eating disorder and psychosocial experts from various LABS sites as well as epidemiologists and survey design specialists from the Data Coordinating Center. The final survey was approved by the Steering Committee of the LABS study. The study assessed frequency of eating each type of meal per week (breakfast, lunch, and dinner), frequency of total snacks/meals per day,

frequency of eating meals at fast food and nonfast food restaurants, and eating when not hungry or when full.

Loss of Control Eating. Loss of control eating was diagnosed by endorsing the following two items, "During the past 6 months, have you had times when you eat continuously during the day or parts of the day without planning what and how much you would eat?" and "did you experience a loss of control; that is you felt like you could not control your eating?"

Binge Eating Disorder. Several items were used to determine the five criteria of BED defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM). The survey items were formulated before finalizing the 5th Edition of the DSM (DSM-5)[20] so the prior 6 months was assessed rather than prior 3 months, and days rather than episodes, as was used in DSM-IV. However, the DSM-5 cut point of once a week was used.

Bulimia Nervosa. The five DSM-5 criteria of bulimia nervosa were determined via responses to a serious of questions assessing vomiting, using excessive laxatives, diuretics, or diet pills exercise, or fasting or withholding insulin to control weight after binge eating, and the role of weight and shape in affecting how one feels about oneself.

Night Eating Syndrome. Participants reporting evening hyperphagia or nocturnal eating were considered to have night eating syndrome. Evening hyperphagia was assessed with the question, *"during the past 3 months, how much of your daily food intake did you consume after suppertime?"* (participant endorsement of "about half" or greater); nocturnal eating was assessed using the question, *"during the past 3 months, when you got up in the middle of the night how often did you snack?"* (participant endorsement of *"about half the time"* or greater), as well as the question, *"when you snacked in the middle of the night, how aware were you of your eating?"* (participant endorsement of *"somewhat"*, *"very much"* or *"completely"*). Participants on night or evening shift work were excluded from the night eating syndrome analysis.

Other Measures. Sex, age, race/ethnicity, marital status, educational level and smoking status were self-reported by questionnaire. Height and weight were assessed by certified researcher staff following standard protocols and used to calculate BMI. Symptoms of alcohol use disorder were assessed with the Alcohol Use Disorder Identification Test.[36]

Psychiatric Treatment. Counseling in the past year for psychiatric or emotional problems, current medication use for psychiatric or emotional problems and treatment for depression (counseling or medication) were assessed with the Psychiatric and Emotional Test Survey and Medication Form (available at www.niddklabs.org).

Depressive Symptoms. Symptoms of depression were measured for the last week using the Beck Depression Inventory V.1 (BDI-1).[37] Points were not assigned to the BDI item "I have lost more than 5 pounds," for participants who indicated purposely trying to lose weight before the surgery, because many of these patients were advised to do so in preparation for surgery. A higher score indicates greater depressive symptoms.

Interpersonal Support. Interpersonal support was measured using the 12-item version of the Interpersonal Support Evaluation List (ISEL).[38,39] A higher score indicates greater interpersonal support.

Quality of Life. Quality of life was measured using the Short Form-36 Health Survey (SF-36)[40] and the Impact of Weight on Quality of Life–Lite (IWQOL-Lite).[41] The SF-36 is a 31-item self-report of health-related quality of life measure. It generates two composite scores: The Mental Composite Score (MCS), and the Physical Composite Score (PCS). The IWQOL-Lite is a 31-item self-report obesity-specific measure, providing a total score and five domain scores including: physical function; self-esteem; sexual life; public distress; and work. Higher scores indicate better functioning.

Data Analysis

Analyses were conducted using SAS (version 9.3; SAS Institute, Cary, North Carolina). Frequencies and percentages are reported for categorical data. Medians, 25th and 75th percentiles are reported for continuous data, which were not normally distributed. Pearson's chi-square test of association for categorical variables and the Wilcoxon rank-sum test for continuous variables were used to assess statistical significance of differences in baseline characteristics between: (1) LABS-2 participants in the analysis versus those who were excluded due to incomplete data, and (2) participants with BED vs. without BED. Multivariable logistic regression was used to identify factors that were independently related to having BED. The following variables were considered: sex, age, race, ethnicity, marital status, education, smoking status, symptoms of alcohol use disorder, regularity of eating each type of meal per week (breakfast, lunch and dinner), frequency of eating snacks/meals, frequency of eating meals from fast food restaurants, frequency of eating meals from any type of restaurant, counseling in the past year for psychiatric or emotional problems, current medication use for psychiatric or emotional problems, treatment for depression (counseling or medication), ISEL score, BDI score, SF-36 MCS and PCS, and IWQOL-Lite domain scores. Continuous variables were centered at the mean. Variables that were not significant in the model (i.e., $p > .05$) were removed using backward elimination. All tests were two-sided.

TABLE 1. Days per week specific meals eaten, meals eaten at restaurants and fast food meals eaten ($n = 2,266$)

	n (%)								
	Meals eaten			Restaurant meals[a]			Fast food meals		
Days/week	Breakfast	Lunch	Dinner	Breakfast	Lunch	Dinner	Breakfast	Lunch	Dinner
Missing	13	14	11	150	148	139	93	80	98
0	95 (4.2)	34 (1.5)	3 (0.1)	1310 (61.9)	665 (31.4)	432 (20.3)	16.5 (73.9)	1088 (49.8)	1114 (51.4)
1–2	253 (11.2)	76 (3.4)	17 (0.8)	538 (25.4)	725 (34.2)	1064 (50.0)	4.8 (18.8)	745 (34.1)	872 (40.2)
3–5	689 (30.6)	503 (27.3)	158 (7.0)	244 (10.6)	605 (28.6)	528 (24.8)	146 (6.8)	325 (14.9)	170 (7.8)
6–7	1216 (54.0)	1639 (72.8)	2077 (92.1)	44 (2.1)	123 (5.8)	103 (4.8)	14 (0.6)	28 (1.3)	12 (0.6)

[a]Includes fast food meals.

Adjusted odds ratios [OR] and 95% confidence intervals [CI] are reported.

Results

The current report excludes 192 LABS-2 participants who did not complete eating behavior questions at the baseline assessment, leaving an analysis sample of 2,266. Those who were excluded were more likely than those included to be black (19.4% vs. 9.7%; $p < .01$). Otherwise they did not differ significantly with respect to demographics or other baseline variables (e.g., smoking status, BMI, depressive symptoms) from those included in the analysis.

The median age of participants in the analysis sample was 46 years (range 18–78 years); 78.6% ($n = 1,780$) were female; 86.9% ($n = 1,954$) were white and 9.7% ($n = 219$) black; 4.9% ($n = 111$) indicated Hispanic ethnicity. Most were married or living as married (63.8%; $n = 1,437$), had some college or post-high school education (77.1%; $n = 1,737$) and were gainfully employed (68.7%; $n = 1,544$). The median BMI was 45.9 kg/m^2, (range = 33.0–94.3 kg/m^2).

Usual eating patterns are shown in **Table 1**. The vast majority reported eating dinner regularly (i.e., 6–7 days/week), whereas just over half reported a regular breakfast. Over a third (35.5%; $n = 783$) of participants reported eating a total of three or four meals/snacks a day, whereas another 45.0% ($n = 994$) reported five to six meals/snacks a day. However, 6.9% ($n = 153$) of participants reported eating fewer than three meals/snacks per day and 12.6% ($n = 277$) reported eating more than six meals/snacks per day. **Table 1** also provides the frequency of self-reported eating at restaurants, including episodes of eating fast food. The median number of restaurant meals per week was four, two of which involved the consumption of fast food. However, there was considerable variability, with a quarter of participants reporting two or fewer restaurant meals per week and a quarter reporting seven or more restaurant meals per week.

More than three-quarters (77.4%) of participants reported eating when not hungry at least once a week, with 10.7% reporting this daily. Over two-thirds (68.2%) reported eating when full at least once a week, with 7.2% reporting this daily. Loss of control eating was fairly common (43.4%; $n = 794$). Night eating syndrome (17.7%; $n = 317$), as defined in this study, was the most common syndromatic problematic eating behavior. Much of this was attributable to the endorsement of the evening hyperphagia item (13.8%; $n = 248$) as opposed to the nocturnal eating items (5.1%; $n = 91$). Concerning eating disorders, 15.7% ($n = 350$) satisfied the criteria for binge eating disorder and 2.0% ($n = 46$) for bulimia nervosa.

We were particularly interested in comparing the characteristics of those with BED versus those without BED given concerns about the eventual impact of this behavior on weight and other outcomes. This information is summarized in **Tables 2** and **3** for the 2,225 participants with known BED status. Compared to those without BED, individuals with BED were less likely to be married or to be living as married, on average had achieved a higher educational level, and were nearly twice as likely to report symptoms of alcohol use disorder. There was not a significant difference between groups with respect to sex, age, race, ethnicity, BMI or smoking status. Night eating syndrome was more than twice as common in participants with BED (**Table 3**). None of the participants with BED satisfied criteria for bulimia nervosa, which would take precedence as a diagnosis. Compared to those without BED, participants with BED were more likely to eat when not hungry or when full, and to consume more meals/snacks per day, more restaurant meals per week, and more fast food meals per week. Despite identical median [IQR] values, the distribution of fast food meals per week differed by

TABLE 2. Sociodemographics and select health characteristics of those with binge eating disorder (BED) vs. those without (non-BED) (*n* = 2225)

	Non-BED (*n* = 1,875)		BED (*n* = 350)		*p*
Male	411	(21.9)	69	(19.7)	.36
Age, years, median (IQR)	45	(37–54)	47	(37–55)	.22
Age group					.27
<30	154	(8.2)	29	(8.3)	
30–39	469	(25.0)	85	(24.3)	
40–49	533	(28.4)	82	(23.4)	
50–59	503	(26.8)	107	(30.6)	
60+	216	(11.5)	47	(13.4)	
Race					.07
White	1604	(86.1)	314	(90.8)	
Black	190	(10.2)	24	(6.9)	
Other	68	(3.7)	8	(2.3)	
Hispanic	95	(5.1)	13	(3.7)	.29
Married/living as	1214	(65.1)	200	(57.3)	<.01
Education					<.01
≤High school	440	(23.6)	66	(19.0)	
Some college	771	(41.3)	126	(36.2)	
≥College degree	654	(35.1)	156	(44.8)	
BMI, kg/m², median (IQR)	45.9	(41.9–51.4)	45.6	(41.3–51.6)	.44
Smoking	235	(12.5)	51	(14.6)	.29
Symptoms of alcohol use disorder	125	(6.7)	43	(12.4)	<.001

BMI, body mass index; *n* (%) unless otherwise noted.

BED status, with smaller proportions of participants with BED reporting 0 and more reporting at least five fast food meals per week compared to those without BED. Those with BED were also more likely to have received counseling for psychiatric or emotional problems in the last 12 months, to be currently taking medication for psychiatric or emotional problems, and to be treated for depression than were those without BED. Questionnaire scores indicated those with BED perceived less interpersonal support, more depressive symptoms and more impaired quality of life in both the physical and emotional spheres than those without BED.

Factors independently related to BED are shown in **Table 4**. Having a college degree, self-reporting symptoms of alcohol use disorder, currently taking medications for psychiatric or emotional problems, eating more meals or snacks a day, and having lower self-esteem and higher depressive symptoms were independently related to higher odds of having BED.

Discussion

The current findings document that before undergoing bariatric surgery, a substantial proportion of patients report unhealthy and problematic eating behaviors. Skipping breakfast, evening hyperpha-

gia, eating when not hungry or full, and eating with a sense of loss of control were common. BED was less common, but still reported by one of six participants. Eating meals from restaurants, and in particular fast food, were also common.[42,43]

Of note, 2% of participants, all of whom had already been cleared for surgery, satisfied DSM-5 criteria for bulimia nervosa. Had bulimia nervosa been identified as part of a standard preoperative psychiatric evaluation, a bariatric surgical procedure probably would have been denied or at least delayed until after treatment for this problem.[44] Thus, the frequency of bulimia nervosa may be higher among those seeking surgery.

One problem in comparing the prevalence of problematic eating behaviors in the LABS-2 cohort to previous studies is the variability in assessment methodology and in the definitions that have been employed. In particular, the criteria for night eating syndrome and BED were in transition when this study was designed. The literature suggests that in pre-bariatric surgery patients, the prevalence of BED may vary from as low as 6%[22,23] to as high as 69%.[24] Our finding of 16% is on the lower end of this spectrum.

Our findings that BED was not significantly associated with sex, age, race, ethnicity or BMI confirms the findings of Jones-Corneille, et al.[25] with a much larger cohort, as do our findings that, compared to those without BED, those with BED were more likely to be on medications for psychiatric or emotional problems (36%), to have great depressive symptoms (29% per 10 BDI points) and lower self-esteem (20% per 10 ISEL points lower). However, contrary to previous studies,[16,25] we found that those with a college degree or higher were more likely to have BED (59%). Why those with higher education level would have a higher likelihood of BED is unclear, but given that it was an independent predictor of BED it warrants further investigation. The association between symptoms of alcohol use disorder and BED found in this study (i.e., 65% greater odds of BED among those with alcohol problems) has also been documented in a study of female college students.[45] However, this association was not found in another cohort of bariatric surgery candidates,[25] and importantly, our prior work found no increased risk of postoperative alcohol problems related to preoperative BED status.[46] It is interesting that although several eating behaviors were not independently related to BED status (i.e., eating specific meals regularly, eating when not hungry, eating when full, eating at restaurants), there was a dose–response relationship

TABLE 3. Eating behaviors, psychosocial factors, and quality of life of those with binge eating disorder (BED) vs. those without (non-BED) (*n* = 2,225)

	Non-BED (*n* = 1,875)		BED (*n* = 350)		*p*
Eating behaviors					
Eat breakfast regularly (6–7/week)	1014	(54.4)	185	(52.9)	.41
Eat lunch regularly(6–7/week)	1354	(72.7)	259	(74.2)	.55
Eat dinner regularly (6–7/week)	1713	(91.9)	328	(93.7)	.23
Eat breakfast, lunch and dinner regularly (6–7/week)	825	(44.4)	140	(40.1)	.13
Meals/snacks/day					<.0001
1–2	140	(7.6)	9	(2.6)	
3–4	683	(37.3)	88	(25.8)	
5–6	806	(44.0)	175	(51.3)	
7 or >	202	(11.0)	69	(20.2)	
Eating when not hungry					<.001
Less than once a week	484	(26.0)	16	(4.6)	
Once a week	746	(40.1)	58	(16.7)	
More than once a week	503	(27.1)	168	(48.4)	
Nearly every day	126	(6.8)	105	(30.3)	
Eating when full					<.001
Less than once a week	686	(36.7)	25	(7.2)	
Once a week	758	(40.6)	97	(27.9)	
More than once a week	349	(18.7)	143	(41.1)	
Nearly every day	74	(4.0)	83	(23.9)	
Restaurant meals/week, median (IQR)	4.0	(2.0,7.0)	4.0	(2.5,8.0)	<.001
Fast food meals/week, median (IQR)	2.0	(0.0, 4.0)	2.0	(0.0,4.0)	<.01[a]
Loss of control eating	506	(27.3)	272	(78.4)	<.001
Night eating syndrome	217	(14.7)	87	(31.1)	<.0001
Evening hyperphagia	164	(11.1)	71	(25.1)	<.0001
Nocturnal eating	64	(4.3)	24	(8.6)	<.01
Bulimia nervosa	46	(2.5)	0	(0.0)	<.01
Psychosocial factors					
Counseling for psychiatric/emotional problems	413	(22.2)	106	(30.5)	<.001
Medication for psychiatric/emotional problems	630	(33.8)	171	(49.0)	<.0001
Treatment for depression	736	(40.4)	183	(53.7)	<.0001
ISEL score, median (IQR)	44.0	(39.0,47.0)	42.0	(36.0,46.0)	<.0001
BDI score, median (IQR)	6.0	(3.0,10.0)	9.0	(4.0,15.0)	<.0001
SF-36 Healthy Survey, median (IQR)					
Physical Component Score	37.0	(27.9,45.4)	34.2	(27.3,42.2)	<.01
Mental Component Score	52.5	(44.4,57.7)	47.3	(36.7,53.6)	<.0001
IWQOL-Lite, median (IQR)					
Total score	48.4	(35.3,62.9)	39.5	(26.6,50.0)	<.0001
Work score	68.8	(43.8,81.3)	56.3	(37.5,68.8)	<.0001
Physical functioning score	43.2	(27.3,59.1)	34.1	(20.5,52.3)	<.0001
Public distress score	55.0	(30.0,75.0)	45.0	(25.0,65.0)	<.0001
Sex life score	56.3	(31.3,81.3)	43.8	(18.8,62.5)	<.0001
Self-esteem score	42.9	(21.4,64.3)	25.0	(10.7,42.9)	<.0001

ISEL, Interpersonal Support Evaluation List; BDI, Beck Depression Inventory; SF-36, Short Form-36; IWQOL-Lite, Impact of Weight on Quality of Life-Lite.
(%) unless otherwise noted.
[a]Despite identical median (IQR) values, the distribution of fast food meals per week by BED status differed, with fewer participants with BED reporting 0 and more reporting at least 5 fast food meals per week compared with those without BED.

between meals/snacks per day and BED, such that those with higher meal frequency had a greater likelihood of BED. For example, those who ate three to four times per day had an 108% greater odds of BED, whereas those who ate seven or more times per day had a 453% greater odds of BED. Participants with BED were more than twice as likely to have night eating syndrome symptoms, including evening hyperphagia and nocturnal eating than those without BED. These results suggest that those with BED before surgery have a number of factors that should be considered as risk factors for problems after bariatric surgery, as has been suggested in the literature previously.[28,29]

It is important to note that (1) measures of eating behavior, including diagnosis of certain specific eating problems and disorders were based on self-assessment rather than interview; (2) structured diagnostic interviews for psychopathology were not administered so other forms of psychopathology that may have been present could not be ascertained and; (3) the criteria employed for BED and night eating syndrome, though the standard when the study was designed, have been subsequently supplanted by more recent work and the publication of the DSM-5; (4) the educational level in our sample was high, as is common in bariatric samples reported from U.S. sites.[47,48] However, this is

TABLE 4. Adjusted odds ratios (AOR) and 95% confidence intervals (CI) for factors independently related to having binge eating disorder (BED) ($n = 2006^a$)

	AOR	95% CI	p
Education (ref = High school or less)			<.01
Some college/post-HS education	1.08	(0.76–1.54)	
College degree or higher	1.59	(1.13–2.25)	
Symptoms of Alcohol Use Disorder(ref = no problem)	1.65	(1.10–2.48)	.02
Meals/snacks per day (ref = 1–2)			<.0001
3–4	2.08	(0.97–4.47)	
5–6	3.27	(1.55–6.92)	
7 or more	5.53	(2.53–12.10)	
Medication for psychiatric/emotional problem (ref = not taking)	1.36	(1.05–1.76)	.02
BDI Score, per 10 points higher	1.29	(1.05–1.58)	.02
IWQOL-Lite Self-esteem Score, per 10 points lower	1.20	(1.13–1.27)	<.0001

BDI, Beck Depression Inventory; IWQOL-Lite, Impact of Weight on Quality of Life-Lite.
^{a}Two hundred nineteen participants with known BED status ($n = 2,225$) were excluded due to missing covariate data.

not always true, including for reports using samples from other countries.[49]

Compared to other research in this area, the relative strengths of this study include a large, carefully characterized sample and a multi-center design with standardized assessment practices across sites, which speaks to generalizability.

Currently available data suggest that patients with BED are at risk for the continuation of or redevelopment of BED post-surgery or loss of control eating following surgery that may predict less favorable weight outcomes. Therefore, screening for such problems, which can be treated with pharmacotherapies and psychotherapies,[50–52] both presurgery and post-surgery may provide useful information to dictate the possible need for treatment.

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