Published in final edited form as:

Obes Surg. 2013 January ; 23(1): 1–6. doi:10.1007/s11695-011-0537-4.

Utility of the Binge Eating Scale in Screening for Binge Eating Disorder with Bariatric Surgery Candidates

Allison, E. Grupski, PhD, Megan M. Hood, PhD, Brian J. Hall, MA, Leila Azarbad, PhD, and Joyce Corsica, PhD

Rush University Medical Center, Department of Behavioral Sciences, 1645 W. Jackson Blvd, Chicago, IL 60612

Abstract

Objective—This study assessed the utility of the Binge Eating Scale (BES) as a measure of binge eating disorder (BED) in patients seeking bariatric surgery by a) determining the optimal BES cut-score for predicting BED, b) calculating concordance statistics, and c) determining the predictive value of each BES item.

Method—480 patients presented for a psychological evaluation prior to Roux-en-Y gastric bypass surgery. The BES and the SCID semi-structured interview for BED were administered.

Results—ROC curve analyses identified an optimal BES cut-score of 17, which correctly classified 78% of patients with BED. A cut-score of 27 improved this statistic, but increased the number of false negatives. Discriminant function analyses revealed that nearly all BES items significantly predicted BED.

Discussion—The BES is a valid screener of BED in a bariatric surgery seeking population. Clarifying the screening process for binge eating can help improve the assessment and treatment of patients presenting for bariatric surgery.

Assessing binge eating behaviors in bariatric surgery candidates is widely practiced among clinicians as part of a larger pre-surgical evaluation¹. A recent review reported that rates of pre-surgical binge eating disorder (BED) ranged from 2% to 49%, and rates of subclinical binge eating behaviors ranged from 6% to 64% across studies². These wide ranges are at least partially due to the variety of assessment tools employed and the inconsistent criteria used to identify eating pathology (i.e., meeting DSM-IV criteria for binge eating disorder vs. subclinical binge eating³), which make it difficult to compare rates of binge eating and related surgical outcomes across studies⁴.

Data illustrating the impact of pre-surgical binge eating on post-surgical eating behaviors and weight loss are mixed. Some findings indicate that high pre-surgical rates of hunger and disinhibition among binge eaters are still present six months post-surgery compared to non-binge eaters, while other reports suggest that surgical intervention may lead to a reduction in binge eating behaviors due to the physiological restrictions imposed by surgery.^{5,6} The impact of pre-surgical binge eating behavior on post-surgical weight loss outcomes is similarly unclear. A number of studies found no differences in weight loss outcomes between patients with and without pre-surgical symptoms of binge eating up to 5.5 years after surgery.^{5,7,8} Other studies, however, report lower percentage of excess weight loss and

greater weight regain when binge eating persists after surgery in patients with clinically significant pre-surgical binge eating pathology.^{9,10,11,12} Identifying the impact of pre-surgical binge eating on surgical outcomes is further complicated by the measurement issues that arise after surgery. Post-surgical patients who are physically unable to rapidly eat large quantities of food cannot meet objective criteria for a diagnosis of BED by definition.^{8,13} This has led researchers to postulate that the criteria of subjective loss of control, rather than quantity of food consumed (for example, while consistently “grazing”), may be more relevant for the post surgical population.^{4,14} Due to unclear surgical outcomes and current measurement uncertainty, patients with pre-surgical binge eating behaviors should be monitored for several years following surgery given the risk for post-operative eating disturbances and greater long-term weight regain.²

Given the continued effort and importance of understanding the relationship between pre-surgical binge eating and post-surgical outcomes, accurate assessment of binge eating is critical. It appears that prior methodological issues, including assessment variability, may contribute to difficulty in outcome prediction.⁴ The purpose of the current investigation was to evaluate the utility of the Binge Eating Scale¹⁵ (BES) in screening for clinically significant binge eating behaviors, as indicated by concordance of the BES with structured clinical interview diagnosis of BED. The BES is a self-report instrument that measures the behavioral and emotional/cognitive symptoms associated with binge eating. It is one of the most commonly used screening tools for measuring binge eating and has been employed in multiple studies of bariatric surgery treatment seeking populations.² It is a brief self-report instrument that measures the behavioral and emotional/cognitive symptoms associated with binge eating. Each of the BES’s 16 items contains 3 to 4 response options reflecting a range of severity for each characteristic measured. Possible total scores range from 0 to 32 with higher scores indicating more severe binge eating symptoms. Based on the BES total score, individuals can be categorized into three groups according to established cut-scores of binge eating severity.¹⁶ These groups are characterized by no binge eating (score < 17), mild to moderate binge eating (score of 18 – 26) and severe binge eating (score ≥ 27). A frequent convention is to use the BES as a screening measure to classify all participants with scores greater than or equal to 17 as “binge eaters.”

The BES has been translated into a variety of languages and validated in multiple international samples.^{17,18,19} Timmerman²⁰ reported adequate two-week test-retest reliability of the BES in a behavioral weight loss sample ($r = .87, p < .001$). To our knowledge, internal consistency of the BES has not yet been reported within the bariatric surgery seeking population.

Despite its wide use, no studies to date have reported the concordance of BES scores and a diagnosis of BED in a bariatric surgery seeking population. However, concordance statistics have been reported with patients seeking or undergoing behavioral and pharmacological weight loss treatment (see Table 1 for a summary of these studies). In these studies, BED was diagnosed using one of two widely-used clinician-directed interviews: the Eating Disorder Examination²¹ (EDE) or the Structured Clinical Interview for DSM-IV Disorders²² (SCID). Concordance statistics between the BES and the EDE in these samples varied based on the BES cut-scores employed and the rate of BED in the sample.²³ Conclusions from

these investigations suggest that the BES is an appropriate measure to screen for binge eating behaviors, although false positives may be common.

Two studies to date have compared the BES to a diagnosis of BED as assessed by the SCID in behavioral weight loss samples. Both of these studies used a non-English language version of the BES and evaluated participants outside of the United States. In a sample of obese Brazilian women seeking non-surgical obesity interventions²⁵, the BES correctly classified 97.8% of all participants who met criteria for BED (sensitivity) and 47.7% of all participants who did not meet criteria for BED using a cut-score of 17. Furthermore, 66.7% of all participants who were classified by the BES as binge eaters actually met criteria for BED (positive predictive value), indicating that approximately one-third of those classified by the BES as binge-eaters were false positives. An Italian study²⁶ employed similar methodology with patients attending an outpatient metabolic disease clinic. The BES correctly classified 84.8% of all participants who met criteria for BED and 74.6% of participants who did not meet criteria for BED. The rate of false positives was higher in this study (nearly 75%), which can most likely be attributed to the low prevalence rate of BED in this sample.

In an effort to determine possible ways to strengthen the concordance of the BES with a BED diagnosis, Greeno and colleagues²⁴ explored the association between each BES item with the EDE obtained diagnosis of BED. Only five of the sixteen items were correlated above .30 with the dichotomous present/absent BED classification, calling into question the construct validity of the BES items. The items that were significantly associated with a BED diagnosis measured preoccupation with eating (item N), guilt after overeating (item F), difficulty controlling eating (item J), preoccupation with food (item O), and eating when not hungry (item E). We are not aware of any other studies that have evaluated the predictive value of the BES items individually.

In summary, the BES has both strengths and weaknesses as a screening measure for BED. Some diagnostic limitations are to be expected, given that the BES was developed prior to the proposed diagnostic criteria for BED's inclusion in the DSM and thus only purports to measure "binge eating severity." In light of its diagnostic limitations and identification of false positives, its good sensitivity and widespread use as a screening tool may reflect the measure's ability to tap core symptoms of binge eating pathology. Despite its wide use, no studies to date have examined the utility of the BES as a screener for BED in bariatric surgery candidates. Therefore, the present study aimed to evaluate the concordance of the BES and BED diagnosis in a bariatric surgery seeking population. A secondary aim was to evaluate the predictive validity of each BES item in identifying BED diagnoses.

METHODS

Procedure and Measures

Patients presented to one of five bariatric surgeons who perform Roux-en-Y gastric bypass surgery. Patients who were appropriate for surgery (i.e., BMI ≥ 40 or ≥ 35 with comorbid weight-related medical conditions, history of failure to achieve and maintain weight loss in several diet programs, and absence of medical contraindications) were referred for a

psychological evaluation which was performed by a licensed clinical psychologist specializing in bariatric surgery. The evaluation consisted of written questionnaires, including the BES as the standard measure of binge-eating-related cognitions and behaviors, and a semi-structured psychosocial interview. The interview covered areas of functioning relevant for bariatric surgery patients, including weight and diet history, current eating habits, emotional eating, psychiatric history, knowledge about surgery, and the SCID assessment for BED. This study was approved by the Rush University Medical Center Institutional Review Board.

Participants

Participants were 473 patients who presented for a psychological evaluation prior to undergoing Roux-en-Y gastric bypass at an urban academic medical center. Participants were primarily female (85%), and either African American (52%), Caucasian (37%), or Hispanic (10%). Ages ranged from 18 to 67 years ($M = 41.7$, $SD = 10.4$) and education ranged from 7 to 25 years ($M = 13.7$, $SD = 2.5$). Body mass index (BMI) ranged from 35 to 84 kg/m² ($M = 50.5$, $SD = 9.2$).

Instrument

*Binge Eating Scale*¹⁵ (BES). The BES is a 16-item instrument designed to measure binge eating symptomatology. In the current study, the cronbach's alpha was .87, indicating excellent internal consistency.

Statistical Analysis

We calculated the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV), as well as the overall classification rates of the BES based on these scores. Sensitivity is the probability of a positive test among patients with disease and specificity is the probability of a negative test among patients without disease. The PPV is the proportion of participants with positive test results who are correctly classified and NPV is the proportion of participants with negative test results who are correctly classified. These values range from 0 – 1, with values closer to 1 indicating better diagnostic accuracy. See Table 2 for the definition of these parameters specific to this study, along with calculation formulas. Concordance was defined as the ability of the BES to correctly classify individuals with BED at cut-scores of >17 (i.e., moderate/severe binge eating) or 27 (i.e., severe binge eating) as used in previous studies.^{16,23,24,25,26} To determine the optimal cut-score within this population, we conducted a receiver operating characteristic (ROC curve) analysis, which is used to demonstrate the diagnostic efficiency of an instrument. Finally, we evaluated whether there was an optimal sub-set of BES items to predict BED using discriminate function analysis (DFA).

RESULTS

As noted in Table 3, 62 individuals were diagnosed with BED based on the SCID interview, yielding a BED prevalence rate of 13.1% in the sample. 156 participants scored > 17 on the BES, yielding a moderate/severe binge eating rate of 33.0%. This cut-score correctly classified 78.4% of the sample in regard to presence/absence of BED. Correct classification

is defined as the number of true positives cases and the number of true negative cases (as established by the SCID interview), divided by the population. Sensitivity was .94, specificity .76, PPV .37, and NPV was .99. Due to the number of false positives that emerged using this score, we tested a more conservative cut-score of 27 or above, based on the score suggested by Marcus and colleagues.¹⁶ Forty-one participants scored 27 or above on the BES, yielding a severe binge eating rate of 8.7%. This cut-score correctly classified 87.9% of the sample as established by the SCID interview. Sensitivity was .37, specificity .96, PPV .56, and the NPV was .91. Compared to possible values, results of the ROC curve analysis indicated that a BES score of 17 was the optimal cut-score, maximizing both specificity and sensitivity in the detection of BED within this population (area under the curve; [AUC] .89, $p < .001$).

Results of the DFA indicated that all BES items significantly discriminated between BED and non-BED participants. The pooled within-groups correlations for 15 of 16 items were above .30, indicating high predictive value for all items except for item P ($r = .26$), which asks participants to report whether they are uncertain about how much food consumption is “normal.” The pooled-within-group correlations for each BES item are reported in Table 5.

DISCUSSION

This study is the first to evaluate the concordance between the Binge Eating Scale (BES) and the diagnosis of binge eating disorder (BED) in a bariatric surgery seeking population. Our results suggest that the BES is a valuable instrument to assess for BED in a diverse sample of obese individuals seeking bariatric surgery for weight reduction.

The ROC curve analysis employed in this study informs our understanding of the utility of the BES for predicting BED. When a cut-score of 17 was used, 93.5% of people with BED (sensitivity) and 76.2% of individuals without BED (specificity) were correctly identified. These findings are similar to those reported in other studies with patients seeking behavioral weight loss interventions. Ricca and colleagues²⁶ reported slightly lower sensitivity and comparable specificity values, while Freitas and colleagues²⁵ reported comparable sensitivity and significantly lower specificity of the BES. In light of these findings, it is notable that the bariatric surgery seeking sample from the present study had similar rates of BED as the sample of outpatients with metabolic diseases studied by Ricca and colleagues²⁶ whereas Freitas and colleagues²⁵ recruited participants from an eating disorders resource center with higher rates of BED. The significantly lower specificity reported by Freitas and colleagues²⁵ suggests that the BES performs better as a predictor of BED in a community sample compared to a eating disordered sample.

Illustrated in Table 4, raising the BES cut-score from 17 to 27 resulted in improved specificity at the cost of significantly reduced sensitivity. Considering raw scores, a cut-score of 27 resulted in 39 individuals who were diagnosed with BED being determined “non-binge eaters” by the BES. Comparatively, a cut-score of 17 only misdiagnosed 4 participants in this manner.

When pre-screening potential bariatric surgery patients, clinicians are likely to be interested in identifying patients who endorse significant binge behaviors, even if they do not meet full criteria for BED. In other words, identifying false positives is often acceptable as further evaluation and appropriate pre-surgical cognitive/behavioral interventions can be recommended. Considering the clinical utility of the BES as a screening instrument, a cut-score of 17 provides the most optimal sensitivity and specificity for this population and thus was retained for the remaining analyses.

The positive predictive value (PPV) of .37 represents the proportion of patients identified by the BES as having BED who were correctly classified. The negative predictive value (NPV) of .99 represents the proportion of patients with negative BES results who were correctly classified. Unlike sensitivity and specificity parameters, the PPV and the NPV are influenced by the diagnostic prevalence of a condition in a sample. In samples with high prevalence rates of BED, it is expected that the PPV will be higher and the NPV will be lower compared to samples with lower BED prevalence rates. This is illustrated in a comparison of the results of Freitas and colleagues²⁵ and Ricca and colleagues²⁶ in Table 1. The BED prevalence rate of 13.1% in the current sample is similar to that reported by Ricca and colleagues²⁶ as expected, the patterns of the PPV and NPV concordance statistics between samples are also similar.

All BES items significantly discriminated between patients with and without BED. Nearly half of the items positively correlated above .5, indicating good predictive value. These values provide evidence for the construct validity of the items and conflict with results previously found by Greeno and colleagues²⁴ who found very low correlations for most items. The discrepancy in results between these two studies might be due to methodological differences (i.e., use of different measures to assess for BED) and/or sample characteristics (i.e. different prevalence rates of BED). Greeno and colleagues²⁴ further found that items measuring restricting and dieting behaviors (items I and G) were negatively correlated with BED diagnosis. The authors explained that this finding was consistent with data showing that overweight binge eaters endorse very little restriction over their eating. The significant, positive correlation found between these items and the BES in the present study might be explained by the possibility that bariatric surgery seekers are more likely to have made many successful and unsuccessful pre-surgical attempts at weight loss. These analyses should be replicated to better understand how each of the BES items function in predicting BED. Furthermore, conducting qualitative analyses to establish response process validity would aid understanding of how accurately participants understand the concepts each item is intended to measure. However, the BES is typically used clinically as a unidimensional scale, so predictive value of specific items may be of less practical clinical importance than the value of the scale as a whole. The current study adds to the literature by providing evidence for the predictive value of the commonly used cut-scores for this measure.

One limitation of the current study is that we were unable to compare post-surgical weight loss and persistence of binge eating symptoms between those who endorsed criteria for BED and those who endorsed sub-clinical symptoms. Future research is needed to determine whether presence of BED impacts the trajectory of surgical recovery and post-surgical weight loss. Additionally, these analyses should be replicated in a sample of patients

undergoing evaluation for laparoscopic adjustable gastric banding (LAGB)-surgery, as previous research has identified higher levels of psychopathology in gastric bypass patients compared to LAGB patients.²⁷

Much has been learned to support the classification of BED as a clinically significant syndrome since the development of the BES.²⁸ However, the impact of pre-surgical binge eating and post-surgical weight loss and disordered eating outcomes remains unclear. Despite this uncertainty, clinicians must make treatment recommendations based on the findings of psychological and behavioral preoperative evaluations. The results of this study suggest that the BES is a valid and useful binge eating screening tool for patients seeking bariatric surgery that will inform a thorough clinical evaluation of eating pathology. The vast majority of patients with BED and most patients without BED will be correctly identified by the BES. The BES may identify a significant number of patients with moderate/severe binge eating who do not meet criteria for BED; this is acceptable for a screening instrument, where false positives are more desirable than false negatives. Finally, clinicians can be very confident (nearly 100%) that a patient with a negative BES screen does not have BED. Given that the BES is one of the most widely-used assessment tools for binge eating in this population, these results add significantly to our understanding of its utility in measuring clinically significant binge eating behaviors that will better enable clinicians to maximize the physical and psychological benefits of bariatric surgery.

References

1. Devlin MJ, Goldfein JA, Flancbaum L, Bessler M, Eisenstadt R. Surgical management of obese patients with eating disorders: A survey of current practice. *Obes Surg.* 2004; 14:1252–1257. [PubMed: 15527644]
2. Niego SH, Kofman MD, Weis JJ, Geliebter A. Binge eating in the bariatric surgery population: A review of the literature. *Int J Eat Disord.* 2007; 40:349–359. [PubMed: 17304586]
3. Diagnostic and Statistic Manual of Mental Disorders. Revised 4th ed. American Psychiatric Association; Washington, D.C.: 2000.
4. Mitchell, JE.; Devlin, MJ.; de Zwaan, M.; Crow, SJ.; Peterson, CB. Binge eating disorder: Clinical foundations and treatment. The Guilford Press; New York: 2008. p. 787
5. Bocchieri-Ricciardi LE, Chen EY, Munoz D, Fischer S, Dymek-Valentine M, Alverdy JC, et al. Pre-surgery binge eating status: Effect on eating behavior and weight outcome after gastric bypass. *Obes Surg.* 2006; 16:1198–1204. [PubMed: 16989704]
6. Kalarchian MA, Wilson GT, Brolin RE, Bradley L. Effects of bariatric surgery on binge eating and related psychopathology. *Eat Weight Disord.* 1999; 4:1–5. [PubMed: 10728171]
7. Malone M, Alger-Mayer S. Binge status and quality of life after gastric bypass surgery: A one-year study. *Obes Res.* 2004; 12:473–481. [PubMed: 15044664]
8. Powers PS, Perez A, Boyd F, Rosemurgy A. Eating pathology before and after bariatric surgery: a prospective study. *Int J Eat Disord.* 1999; 25:293–300. [PubMed: 10191994]
9. de Zwaan M, Hilbert A, Swan-Kremeier L, Simonich H, Lancaster K, Howell LM, et al. Comprehensive interview assessment of eating behavior 18-35 months after gastric bypass surgery for morbid obesity. *Surg Obes Relat Dis.* 2010; 6:79–85. [PubMed: 19837012]
10. Green AE, Dymek-Valentine M, Pytluk S, le Grange D, Alverdy J. Psychosocial outcome of gastric bypass surgery for patient with and without binge eating. *Obes Surg.* 2004; 14:975–985. [PubMed: 15329189]
11. Kalarchian MA, Marcus MD, Wilson GT, Labouvie EW, Brolin RE, LaMarca LB. Binge eating among gastric bypass patients at long-term follow-up. *Obes Surg.* 2002; 12:270–275. [PubMed: 11975227]

12. Mitchell JE, Lancaster KL, Burgard MA, Howell LM, Krahn DD, Crosby RD, Wonderlich SA, Gosnell BA. Long-term follow-up of patients' status after gastric bypass. *Obes Surg.* 2001; 11:464–468. [PubMed: 11501356]
13. Dymek MP, le Grange D, Neven K, Alverdy J. Quality of life and psychosocial adjustment in patients after roux-en-y gastric bypass: A brief report. *Obes Surg.* 2001; 11:32–39. [PubMed: 11361166]
14. Saunders R. "Grazing": A high-risk behavior. *Obes Surg.* 2004; 14:98–102. [PubMed: 14980042]
15. Gormally J, Black S, Daston S, Rardin D. The assessment of binge eating severity among obese persons. *Addict Behav.* 1982; 7:47–55. [PubMed: 7080884]
16. Marcus MD, Wing RR, Hopkins J. Obese binge eaters: Affect, cognitions, and response to behavioral weight control. *J Consult Clin Psychol.* 1988; 3:433–439. [PubMed: 3397436]
17. Di Bernardo M, Barciulli E, Ricca V, Mannucci E, Moretti S, Cabras PL, et al. Binge eating scale in obese patients: Validation of the Italian version. *Minerva Psichiatr.* 1998; 39:125–130.
18. Freitas S, Lopes CS, Coutinho W, Appolinario JC. Translation and adaption into Portuguese of the binge-eating scale. *Rev Bras Psiquiatr.* 2001; 23:215–220.
19. Partida OZ, García RR, Cárdenas AR, Agraz FP. Evaluation of the binge eating scale in Mexican population: Translation and psychometric properties of the Spanish version. *Psiquiatría.* 2006; 22:30–36.
20. Timmerman GM. Binge eating scale: Further assessment of validity and reliability. *J Appl Biobehav Res.* 1999; 4:1–12.
21. Fairburn, CG.; Cooper, Z. The eating disorders examination. In: Fairburn, CG.; Wilson, GT., editors. *Binge eating: nature, assessment, and treatment.* 12th ed. The Guilford Press; New York: 1993. p. 317-331.
22. First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured clinical interview for DSM-IV-TR axis I disorders—patient edition (SCID-I/P). Biometrics Research, New York State Psychiatric Institute; New York: 2002.
23. Celio AA, Wilfley DE, Crow SJ, Mitchell J, Walsh T. A comparison of the binge eating scale, questionnaire for eating and weight patterns-revised, and eating disorder examination questionnaire with instructions with the eating disorder examination in the assessment of binge eating disorder and its symptoms. *Int J Eat Disord.* 2004; 36:434–444. [PubMed: 15558644]
24. Greeno CG, Marcus MD, Wing RR. Diagnosis of binge eating disorder: Discrepancies between a questionnaire and clinical interview. *Int J Eat Disord.* 1995; 2:153–160. [PubMed: 7757096]
25. Freitas SR, Lopes CS, Appolinario JC, Coutinho W. The assessment of binge eating disorder in obese women: A comparison of the binge eating scale with the structured clinical interview for the DSM-IV. *Eat Behav.* 2006; 7:282–289. [PubMed: 16843232]
26. Ricca V, Mannucci E, Moretti S, Di Bernardo M, Zucchi T, Cabras PL, et al. Screening for binge eating disorder in obese outpatients. *Compr Psychiatry.* 2000; 41:111–115. [PubMed: 10741889]
27. Hood MM, Corsica JA, Azarbad L. Do patients seeking laparoscopic adjustable gastric banding surgery differ from those seeking gastric bypass surgery? A comparison of psychological profiles across ethnic groups. *Obes Surg.* 2010 E-pub ahead of print.
28. Wilfley DE, Wilson CT, Agras WS. The clinical significance of binge eating disorder. *Int J Eat Disord.* 2003; 34:S96–S106. [PubMed: 12900990]

Table 1

Summary of BES and BED concordance data

Study	Rate of BED	BES cut-score		BED measure	Sensitivity	Specificity	NPV	PPV
		High BE	Low BE					
Celio et al. ¹	85.8%	27	<27	EDE	.85	.20	.18	.88
Greeno et al. ²	N/A *	27	17	EDE	.93	.49	.93	.52
Freitas et al. ³	51.7%	> 17	17	SCID	.98	.48	.95	.67
Ricca et al. ⁴	7.5%	> 17	17	SCID	.85	.75	.98	.26

Note: SCID = Structured clinical interview diagnostic; BED = binge eating disorder; BES = Binge Eating Scale; EDE = Eating Disorders Examination (interview); BE = binge eating.

¹ Sample of primarily female patients participating in a study examining pharmacological treatment of BED.

² Sample of women applying to a combined behavioral/pharmacologic weight loss program.

³ Sample of obese women seeking outpatient obesity treatment.

⁴ Sample of primarily obese female patients attending an outpatient clinic for metabolic diseases.

* Participants were recruited until data from a previously determined number of binge eaters and non-binge eaters were collected.

Table 2

Definition of parameter statistics

Concordance Parameter	Definition	Formula
Sensitivity	Proportion of patients with BED who were correctly identified with the BES	$TP/(TP + FN)$
Specificity	Proportion of patient without BED who were correctly identified with the BES	$TN/(FP + TN)$
Positive Predictive Value	Proportion of patients with positive BES results who were correctly identified as having BED	$TP/(TP + FP)$
Negative Predictive Value	Proportion of patients with negative BES results who were correctly identified as having BED	$TN/(FN + TN)$

Note: BED = binge eating disorder. BES = Binge Eating Scale. TP = true positive; TN = true negative; FP = false positive; FN = false negative.

Table 3

BES cut-scores of 17 and 27 with SCID diagnosis

BES score	SCID Diagnosis		Total
	BED	Non-BED	
>17 (BE)	58	98	156
17 (NBE)	4	313	317
Total	62	411	473
27 (BE)	23	18	41
<27 (NBE)	39	393	432
Total	62	411	473

Note: SCID = Structured clinical interview diagnostic. BED = Binge Eating Disorder. BES = Binge Eating Scale. BE = binge eating. NBE = non binge eating.

Table 4

Prevalence and classification accuracy for BED for the Binge Eating Scale compared to SCID interview

		Prevalence	Sensitivity	Specificity	NPV	PPV	Correct classification rate
SCID		13.1% ¹					
BES > 17		33.0% ²	.94	.76	.99	.37	78.4%
BES 27		8.7% ³	.37	.96	.91	.56	87.9%

Note: SCID = Structured clinical interview diagnostic. BED = binge eating disorder. BES = Binge Eating Scale. BES > 17 refers to a cut-score of 17. BES 27 refers to a cut-score of 27.

¹Prevalence of BED as classified by the SCID.

²Prevalence of positive screens based on a BES cut-score of 17.

³Prevalence of positive screens based on a BES cut-score of 27. Correct classification rate is the number of correct positive cases + correct negative cases divided by the population. Classification accuracy statistics use the SCID interview as the criterion.

Table 5

Correlation of predictor variables with discriminate function and standardized discriminant function coefficients

BES item	Pooled within-groups correlation(Function structure matrix)
BES (J) Difficulty controlling eating	.67
BES (O) Preoccupied with food	.63
BES (L) Conceal eating	.61
BES (H) Eat till stuffed	.59
BES (D) Eat when bored	.57
BES (N) Preoccupation with eating	.52
BES (K) Eat till stuffed, sometimes vomit	.50
BES (F) Guilt after overeating	.47
BES (C) Difficulty controlling eating urges	.47
BES (A) Self-conscious about weight	.45
BES (G) Diet and binge	.43
BES (B) Eat quickly	.42
BES (M) Eat continually (no planned meals)	.39
BES (E) Eat when not hungry	.36
BES (I) Diet/Restrict and binge	.36
BES (P) Uncertain how much food is normal"	.26

Note: BES = Binge Eating Scale.