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What Constitutes Clinically Significant Binge Eating? Association Between Binge Features and Clinical Validators in College-Age Women

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ABSTRACT

Objective: To investigate the association between binge features and clinical validators.

Method: The Eating Disorder Examination assessed binge features in a sample of 549 college-age women: loss of control (LOC) presence, binge frequency, binge size, indicators of impaired control, and LOC severity. Clinical validators were self-reported clinical impairment and current psychiatric comorbidity, as determined via a semistructured interview.

Results: Compared with women without LOC, those with LOC had significantly greater odds of reporting clinical impairment and comorbidity ($ps < 0.001$). Among women with LOC ($n = 252$), the indicators of impaired control and LOC

severity, but not binge size or frequency, were associated with greater odds of reporting clinical impairment and/or comorbidity ($ps < 0.05$).

Discussion: Findings confirm that the presence of LOC may be the hallmark feature of binge eating. Further, dimensional ratings about the LOC experience—and possibly the indicators of impaired control—may improve reliable identification of clinically significant binge eating. © 2013 by Wiley Periodicals, Inc.

Keywords: binge eating; clinical impairment; psychiatric comorbidity; classification; eating disorders; diagnosis; loss of control eating

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Introduction

Four criteria currently are used to determine the threshold for clinically significant binge eating. The two core features of binge episodes include the

consumption of an unambiguously large amount of food and the subjective experience of loss of control (LOC) over eating.¹ Additionally, binge eating must occur persistently for at least an average of two times per week to warrant a full syndrome eating disorder diagnosis.¹ However, the DSM-5 Feeding and Eating Disorders Workgroup recommended that the binge frequency criterion for bulimia nervosa and binge eating disorder be reduced to once per week for three months.² Finally, the presence of three or more “indicators of impaired control”—a set of emotional and behavioral criteria used to assist in deciding whether LOC was present during an overeating episode—is required to make a diagnosis of binge eating disorder only.¹ Despite its prevalence and significance, the taxonomy of binge eating remains poorly understood (for comprehensive review, see Wolfe and colleagues³).

To date, most research has focused on the validity of criteria related to LOC presence, binge size, and binge frequency. The presence of LOC appears to be the most salient feature of binge eating, as it consistently has demonstrated associations with eating-related and general psychopathology.^{4–6} However, LOC presence has yet to be examined in relation to measures of clinical impairment and psychiatric comorbidity. Findings on the signifi-

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cance of binge size have been mixed; several studies suggest that objectively large binge episodes may be indicative of greater eating and psychological disturbances as compared to smaller, subjectively large binges^{7,8} and other studies have found no differences between large and not large binge episodes.⁴⁻⁶ Studies examining binge frequency have found no clinically meaningful differences between individuals reporting binge eating once versus twice per week in patients meeting all other criteria for bulimia nervosa and binge eating disorder (for systematic review of findings, see Ref. 9). Yet, there has been little work comparing individuals that meet the once weekly criterion with those who report less frequent binge eating on clinical correlates.

Little research has examined the utility of other secondary components of binge eating. Only one known study has examined the utility of the indicators of impaired control,¹⁰ which suggested that the presence of three or more indicators was the most diagnostically efficient (maximizing sensitivity for predicting binge eating presence while minimizing false positives) criterion for correctly predicting diagnoses of binge eating disorder or bulimia nervosa. There are no known data looking at whether the presence of three or more indicators of impaired control is associated with clinical correlates. The shift toward dimensional ratings of psychopathology in DSM-5¹¹ highlights the importance of considering dimensional features related directly to the experience of LOC. In one study, higher levels of LOC-related distress, rather than the sole presence of LOC or objectively large binge episodes, was associated most closely with greater body dissatisfaction and psychopathology.¹² These preliminary findings indicate that self-reported ratings of the LOC experience may be a new binge feature that could be diagnostically relevant and therefore warrants further examination.

Overall, it remains unclear as to which binge features contribute to a clinically significant threshold of binge eating. Moreover, previous research often only has investigated one binge eating feature per study, limiting our ability to compare each feature's relative predictive value. The empirical validation of binge features has the potential to greatly enhance research on the etiology, assessment, prevention, and treatment of binge eating-type syndromes.³ Thus, the primary objective of the current study was to examine the degree to which five binge eating features—LOC presence, binge size, binge frequency, indicators of impaired control, and LOC severity—were associated with clinical validators among a sample of college-age wo-

men. Based on available empirical evidence, we hypothesized that the presence of LOC, the diagnostic thresholds for binge size (i.e., OBEs), binge frequency (i.e., once per week), and impaired control indicators (i.e., three or more), as well as high levels LOC-related distress would be associated with a greater likelihood of having clinically significant impairment in psychosocial domains and psychiatric comorbidity.

Method

Participants

Participants were women aged 18–25 years. The vast majority of women were enrolled in undergraduate or graduate level courses at local universities. Women were included in this study if they were identified as meeting criteria for one of three possible eating disorder risk categories: clinical eating disorder (i.e., meeting DSM-IV-TR criteria for a threshold or subthreshold eating disorder), high risk for eating disorder onset (i.e., self-reported elevated concerns about weight and shape), and low risk for an eating disorder (i.e., meeting criteria for neither an eating disorder nor high risk status). A detailed description of how clinical case and risk status were determined was previously described.¹³ Women were excluded if they were actively suicidal, suffering from a severe psychiatric disorder (e.g., bipolar disorder, psychotic disorder), or residing outside the metropolitan regions of the university sites.

Procedures

Participants were recruited from the St. Louis, Sacramento, and San Francisco Bay areas via fliers posted at local academic institutions, Facebook, and Craigslist, as well as campus e-mail solicitations; detailed recruitment procedures are described elsewhere.¹³ Potential participants completed a brief screening questionnaire that assessed for inclusion criteria through email or over the phone and were invited for an in-person assessment. To confirm study eligibility, trained assessors measured participants' height (cm) and weight (kg) in triplicate and conducted two semi-structured diagnostic interviews to determine the presence of eating disorder symptoms and psychiatric comorbidity. Eligible women completed additional self-report questionnaires. Each study site's institutional review board approved the study protocol, and all participants provided informed consent. Measures were completed between September, 2009 and June, 2010.

Measures

Eating Disorder Examination, 14th Edition Diagnostic Version (EDE 14.0). The EDE 14.0¹⁴ is a semistructured interview that was administered to determine DSM-IV eating disorder diagnoses. The EDE was also used to

determine the presence or absence of LOC. Among women reporting LOC, the four secondary features of binge eating were assessed, which were considered categorically and dimensionally (see Table 1). The EDE has demonstrated good test-retest reliability, inter-rater reliability, and validity.^{15,16}

Dimensional LOC Severity Index. The EDE was also revised to assess the average typical LOC severity, the greatest LOC severity experienced, and the average distress associated with LOC. These scores were combined to create the Dimensional LOC Severity Index (see Appendix for detailed information on the creation of this measure). The Dimensional LOC Severity Index demonstrated very good reliability ($\alpha = 0.80$), indicating the items are assessing a cohesive construct. Factor analysis confirmed that this subscale is uni-dimensional; principal components analysis with a Promax rotation ($\kappa \geq 0.4$) revealed that the initial Eigenvalue (2.16) for the factor explained 72% of the variance. Factor loadings for all three items of the Dimensional LOC Severity Index were between 0.72 and 0.91.

Clinical Impairment Assessment 3.0 (CIA). The CIA is a 16-item, self-report questionnaire designed to measure clinical impairment in psychosocial domains that are due to eating disorder features in the past 28 days.¹⁷ A global score of 16 was used in the current study to capture clinically significant levels of impairment, as it predicts eating disorder case status among individuals with or recovering from an eating disorder.¹⁷ The CIA has demonstrated high internal consistency, test-retest reliability, sensitivity to change, construct validity, and discriminant validity.^{13,17}

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID). The SCID is a semistructured clinical interview used to determine the presence or absence of current and lifetime DSM-IV Axis I psychiatric disorders.¹⁸ Three summary variables of current comorbidity served as a proxy for clinically significant psychological distress in this study: any psychiatric comorbidity, any mood disorder, and any anxiety disorder. The SCID has shown good interrater reliability and validity.^{18,19}

Analytic Plan

Binary logistic regression models tested the association between binge eating features and clinical validators. Dependent variables were the presence or absence of clinical impairment and psychiatric comorbidity (any comorbidity, any mood disorder, any anxiety disorder). For all models, demographic variables (age, racial/ethnic background, highest parental education status) and body mass index (kg/m^2) were included in the first step. In the models examining clinical impairment, a global psychopathology index (total number of comorbidities as assessed by the SCID) was included as a covariate in a second step to determine whether binge features were associated with impairment above and beyond general distress. The independent variables (*Full sample*: LOC presence; *Subset of sample*: binge size, binge frequency, indicators of impaired control, LOC severity) were included in the third step for impairment models and in the second step for comorbidity models. Preliminary analyses ensured no violation of the non-multicollinearity assumption. For analyses of secondary binge features, each model was run twice for each outcome variable:

TABLE 1. Assessment of secondary binge features among women reporting the experience of loss of control (LOC) over eating

Binge Feature	Operational Definition	Categorical Measure	Dimensional Measure
Binge frequency	Sum of the number of OBEs and SBEs in the previous 3 months	Presence or absence of at least 12 binge episodes in the past 3 months	Total number of binge episodes in the past 3 months
Binge size	Determination of the presence or absence of SBEs and OBEs by assessing representative episodes	Three groups coded as “only SBEs,” “only OBEs,” and “SBEs and OBEs”	Rating scale based on increasing episode size and theoretical pathology: “only SBEs” = 0, “only OBEs” = 1, “SBEs and OBEs” = 2
Indicators of impaired control	Determination of the presence or absence of each indicator: 1. Eating in the absence of hunger 2. Eating more rapidly than normal 3. Eating until feeling uncomfortable 4. Feeling guilty, disgusted, or depressed after binge eating 5. Eating alone due to embarrassment	Presence or absence of three or more indicators of impaired control	Total number of indicators of impaired control that were present (potential values between 0-5)
LOC severity ^a	Weighted mean from OBEs and SBEs on three dimensional features of LOC: 1. Typical LOC severity 2. Greatest LOC severity 3. Typical LOC distress	Three groups coded as “Low” (bottom 25% of scores; ≤ 5.333), “Moderate” (middle 50% of scores; 5.334 to 7.666), and “High” (top 25% of scores; ≥ 7.667)	Average of the weighted means of typical LOC severity, greatest LOC severity, and typical LOC distress (potential values between 0-10)

All secondary binge features were assessed using the Eating Disorder Examination. OBEs, objective binge episodes, defined as the episodes in which women consumed an unambiguously large amount accompanied by a sense of LOC over eating. SBEs, subjective binge episodes, defined as episodes in which women felt a LOC over eating while consuming a non-unambiguously large amount of food that was perceived as an excessive amount.

^a Detailed information about the creation of the Dimensional LOC Severity Index can be found in Appendix.

first, with all binge features coded categorically and, second, with all binge features considered dimensionally. These analyses were conducted to account for possible differences in the predictive utility of a given binge feature based on the structure or content of the measures. All analyses were conducted with SPSS v. 19.0 (SPSS, Chicago, IL). *P* values of ≤ 0.05 were considered statistically significant; all tests were two-tailed.

Results

Participants were 549 college-age women (mean age = 20.7 ± 2.0 years) representing a broad range of eating disorder risk status (19% clinical eating disorder, 63% high risk for eating disorder onset, 18% low risk). The sample was 56% ($n = 305$) non-Hispanic White, 22% ($n = 118$) Asian Origin, 9% ($n = 48$) Black/African American, 8% ($n = 46$) Hispanic/Latino/Mexican Origin, and 5% ($n = 32$) Other. The breakdown of highest level of parental education was 2% ($n = 11$) less than high school, 27% ($n = 148$) high school graduate, 25% ($n = 137$) college graduate, and 46% ($n = 253$) graduate degree. The total number of Axis I psychiatric comorbidities ranged from 0 to 8, with a median of 1.

Loss of Control (LOC) Presence

Approximately 46% ($n = 252$) of the sample reported LOC during at least one overeating episode in the past 3 months. Women with LOC were 4.26 times more likely to report clinical impairment as compared to women without LOC (44.0 vs. 13.6%; AOR = 5.26, 95% CI = 2.73-6.65; $p < .001$). As compared to the absence of LOC, the presence of LOC was associated with 1.67 times greater odds of reporting any psychiatric comorbidity (67.1 vs. 45.1%; AOR = 2.67, 95% CI = 1.87-3.82; $p < .001$). Women with LOC were 1.36 times more likely to report any mood disorder (55.6 vs. 36.4%; AOR = 2.36, 95% CI = 1.66-3.35; $p < .001$) and 2.11 times more likely to report any anxiety disorder (35.3 vs. 15.5%; AOR = 3.11, 95% CI = 2.06-4.71; $p < .001$) as compared to women without LOC.

Secondary Binge Features

Among the subset of women with LOC ($n = 252$), 51.2% ($n = 129$) had subjective binge episodes (SBEs) only, 15.9% ($n = 40$) had objective binge episodes (OBEs) only, and 32.9% ($n = 83$) had both SBEs and OBEs. Approximately 51.2% ($n = 129$) reported an average binge frequency of at least once per week for the past 3 months. 76.2% ($n = 192$) of women reported the experience of 3 or more indicators of impaired control. By design, the

breakdown of LOC severity was 25.4% ($n = 64$) low, 48.0% ($n = 121$) moderate, and 25.0% ($n = 63$) high; 1.6% ($n = 4$) of women did not report on their LOC severity. LOC severity—but not binge size, binge frequency, or the indicators of impaired control—was associated with greater odds of reporting clinical impairment (Table 2) and any comorbidity (Table 3). Indicators of impaired control and LOC severity—but not binge size or binge frequency—were associated with greater odds of reporting any mood disorder (Table 3). There was no significant association between the presence or absence of secondary binge eating features and the odds of having any anxiety disorder (Table 3). The pattern of results was unchanged when analyses used dimensional measures of binge eating features (see online supplementary tables for presentation of these results); the Cox & Snell and Nagelkerke R-squared values did not change by more than .03 when using categorical versus dimensional models.

Discussion

Improving classification of binge eating is critical to enhance clinical efforts, such as identifying individuals at risk for an eating disorder, predicting patients' prognosis, and monitoring treatment response. The current study examined the association between binge features and clinical validators among college-age women. Consistent with previous work,³ the presence of LOC was a robust predictor of impairment and psychiatric comorbidity in the present study. The indicators of impaired control

TABLE 2. Association between secondary binge features and clinical impairment among women reporting the experience of loss of control over eating

Binge Feature	Clinical Impairment ^a		
	% Present (n)	AOR (95% CI)	<i>p</i> Value
< 12 Binge episodes (ref)	32.8 (40)	—	—
12+ Binge episodes	54.3 (70)	1.89 (0.98-3.65)	.06
SBEs only (ref)	39.5 (51)	—	—
OBEs only	40.0 (16)	1.00 (0.41-2.43)	.99
OBEs + SBEs	53.0 (44)	1.29 (0.70-2.74)	.35
< 3 Indicators (ref)	23.7 (14)	—	—
3+ Indicators	50.0 (96)	1.92 (0.87-4.24)	.11
Low LOC severity (ref)	15.6 (10)	—	—
Moderate LOC severity	44.6 (54)	3.19 (1.42-7.17)	.01
High LOC severity	71.4 (45)	8.06 (3.05-21.30)	<.001

AOR, adjusted odds ratio, which represents results after controlling for age (years), highest level of parental education, racial/ethnic background, body mass index (kg/m^2), and number of DSM-IV-TR Axis I psychiatric comorbidities.

^a The presence or absence of clinically significant impairment was determined by using the suggesting cut-off score (at least 16) of the Clinical Impairment Assessment.

TABLE 3. Association between secondary binge features and psychiatric comorbidity among women reporting the experience of loss of control over eating.

Binge Feature	Any Comorbidity%			Any Mood Disorder%			Any Anxiety Disorder%		
	Present (n)	AOR (95% CI)	p Value	Present (n)	AOR (95% CI)	p Value	Present (n)	AOR (95% CI)	p Value
< 12 Binge episodes (ref)	67.2 (82)	—	—	55.7 (68)	—	—	39.3 (48)	—	—
12+ Binge episodes	66.7 (86)	0.59 (0.31–1.12)	0.11	55.0 (71)	0.73 (0.40–1.32)	0.29	31.0 (40)	0.56 (0.30–1.04)	0.06
SBEs only (ref)	63.6 (82)	—	—	52.7 (68)	—	—	34.9 (45)	—	—
OBEs only	62.5 (25)	0.61 (0.27–1.39)	0.24	57.5 (23)	0.76 (0.35–1.68)	0.50	32.5 (13)	0.61 (0.27–1.40)	0.25
OBEs + SBEs	74.7 (62)	1.68 (0.87–3.27)	0.13	59.0 (49)	1.23 (0.67–2.26)	0.52	37.3 (31)	1.17 (0.62–2.19)	0.63
< 3 Indicators (ref)	57.6 (34)	—	—	39.0 (23)	—	—	25.4 (15)	—	—
3+ Indicators	69.8 (134)	1.34 (0.68–2.66)	0.40	60.4 (116)	2.05 (1.05–4.02)	0.04	38.5 (74)	2.00 (0.95–4.21)	0.07
Low LOC severity (ref)	56.3 (36)	—	—	45.3 (29)	—	—	32.8 (21)	—	—
Moderate LOC severity	65.3 (79)	1.27 (0.64–2.51)	0.49	52.9 (64)	1.14 (0.59–2.21)	0.69	33.1 (40)	0.93 (0.47–1.86)	0.84
High LOC severity	79.4 (50)	3.08 (1.23–7.70)	0.02	69.8 (44)	2.32 (1.00–5.41)	0.05	41.3 (26)	1.39 (0.60–3.25)	0.44

Omnibus tests for all binary logistic regression models were statistically significant. AOR, adjusted odds ratio, which represents results after controlling for age, highest level of parental education, racial/ethnic background, and body mass index (kg/m^2); SBEs, subjective binge episodes; OBEs, objective binge episodes; indicators, indicators of impaired control; LOC, loss of control.

and the dimensional measure of LOC severity—but not binge size or frequency—also appeared to provide additional predictive value of impairment and comorbidity beyond LOC presence. Findings extend prior research on the clinical utility and validity of core binge features and further highlight the importance of considering alternative components in the diagnostic criteria for binge eating.

In contrast to our hypotheses and previous research,^{3,9} binge frequency and size were not associated with women's likelihood of reporting clinical impairment and psychiatric comorbidity. This finding regarding binge size highlights the difficulty in reliably differentiating between large and not large episodes,^{20,21} particularly as meal sizes have increased in the population.²² Further, binge frequency—when considered together with other clinically meaningful indicators—may have had less utility beyond the presence of at least one binge episode during the past 3 months in this sample.

Consistent with hypotheses, women reporting moderate-to-high LOC severity had a greater likelihood of having clinical impairment and psychiatric comorbidity. Findings showing that LOC severity was associated with clinical validators build upon emerging evidence suggesting that the presence of distress about binge eating and the experience of LOC is clinically relevant among patients with binge eating disorder.^{12,23} Notably, a substantial percentage (30%) of women with LOC also reported compensatory behaviors; these data suggest that the presence of moderate-to-high LOC severity may improve reliable diagnosis of clinically significant binge eating among individuals with bulimia nervosa-type disorders as well as binge eating disorder-type disorders. Findings support the utility of assessing dimensional distress and severity features

of the LOC experience in addition to merely the presence of LOC.

Among women with LOC, those reporting the presence of three or more indicators of impaired control had a greater likelihood of reporting any mood disorder, but there was no association with clinical impairment above and beyond general psychopathology. These findings suggest that the indicators of impaired control could be suggestive of broader mood-related disturbances rather than functional impairment directly related to eating disorder symptoms. Results represent the first known data of the DSM impaired control indicators in relation to clinical correlates, and require replication. It is also notable that the vast majority (~75%) of women with LOC reported the presence of at least three indicators. It is possible that these indicators capture aspects of a binge episode that are very common but not sufficiently severe enough to reliably identify clinically significant binge episodes; therefore, it would be beneficial to examine the utility of alternative behavioral or emotional indicators (e.g., dissociation or feelings of emotional numbness during an episode).

The current study has several notable strengths including a large and diverse sample spanning a broad range of eating pathology, use of semi-structured clinical interviews to assess binge eating and comorbidity, and a high threshold for determining the presence of impairment and psychological distress. Analyses of clinical impairment also included the total number of reported psychiatric comorbidities to ensure that binge features were capturing phenomena above and beyond general psychological distress. Moreover, this study represents the first known investigation of the validity of all potential features of binge eating concurrently.

These procedures increase confidence that clinically significant binge features have been identified that may have implications for future revisions to binge eating diagnostic criteria. Limitations of the current study include that the sample only consisted of college-age women and was enriched for those at high risk for eating disorder onset, thus limiting generalizability. The reliance on self-report to assess clinical impairment could also be a limitation; however, a prior study found that the CIA was associated with independent clinician ratings of impairment in eating disorder samples.¹⁷ Replication of these findings is needed in men and across the lifespan as well as in studies with other clinical validators. Future work should also evaluate whether binge features are associated with clinical validators above and beyond trait variables such as negative urgency or impulsivity.

In conclusion, findings confirm that the presence of LOC may be the hallmark feature of binge eating. The assessment of dimensional aspects of the LOC experience may provide additional predictive value for determining clinically significant binge eating. The assessment of emotional and behavioral indicators of impaired control could provide a marker for general psychological distress, particularly related to negative mood. However, binge size and binge frequency may not be associated with impairment and distress beyond that associated with LOC presence, at least when considered concurrently with the indicators of impaired control and LOC severity. Future studies should evaluate the extent to which binge features are associated with objective measures of harmful dysfunction such as laboratory binge eating behavior and adverse biological correlates. It would also be beneficial to examine these binge features conjointly in the prediction of the emergence of clinical impairment and adverse health outcomes (e.g., excess weight gain), development of eating disorders, and treatment response.

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Appendix: Dimensional Loss of Control (LOC) Severity Index

The Eating Disorder Examination (14) was revised to assess the average typical LOC severity, the greatest LOC severity experienced, and the average distress associated with LOC. To assess typical LOC severity, participants were asked, "In thinking back on a typical episode over the past 3 months, how would you rate the intensity (or degree) of LOC on a scale from 1 (not very intense) to 10 (extremely intense)?" To assess greatest LOC severity, participants were asked, "Using the same scale (1 [not very intense] to 10 [extremely intense]), in the past 3 months, what was the maximum intensity of loss of control that you felt?" To assess average typical LOC distress, participants were asked, "In general, over the past 3 months, how distressed or upset did you feel about these episodes?" and rated on a 5-point Likert-type scale, from 1 ("not at all distressed") to 5 ("extremely distressed").

Average LOC distress and average/greatest LOC severity were assessed for both objective binge episodes (OBEs) and subjective binge episodes (SBEs). To combine these ratings into overall LOC distress and overall average/greatest LOC severity variables, weighted means were used based on the frequency of OBE and SBE episodes. For example, if a participant reported 10 OBEs and rated her typical LOC distress regarding OBEs as a 4, and she reported 5 SBEs and rated her typical LOC distress regarding SBEs as a 2, then the weighted mean would be $[(10 \times 4) + (5 \times 2)] / 15 = 3.33$. A total Dimensional LOC Severity Index score was created by computing the average of the typical LOC severity, greatest LOC severity, and LOC distress (multiplied by two to have the same scaling as the severity questions) weighted mean scores. Therefore, the Dimensional LOC Severity Index scores range from 0-10, with higher scores indicating greater overall LOC severity. To create a categorical measure of the dimensional LOC experience, the Dimensional LOC Severity Index scores were coded in the following manner: 1) "Low" was the bottom 25% of scores (≤ 5.3333); 2) "Moderate" was the middle 50% of scores (5.3334 to 7.6665); and 3) "High" was the top 25% of scores (≥ 7.6666).