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Are loss of control while eating and overeating valid constructs? A critical review of the literature

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Abstract

Background—Binge eating is a marker of weight gain and obesity, and a hallmark feature of eating disorders. Yet, its component constructs—overeating and loss of control (LOC) while eating—are poorly understood and difficult to measure.

Objective—To critically review the human literature concerning the validity of LOC and overeating across the age and weight spectrum.

Data sources—English-language articles addressing the face, convergent, discriminant, and predictive validity of LOC and overeating were included.

Results—LOC and overeating appear to have adequate face validity. Emerging evidence supports the convergent and predictive validity of the LOC construct, given its unique cross-sectional and prospective associations with numerous anthropometric, psychosocial, and eating behavior-related factors. Overeating may be best conceptualized as a marker of excess weight status.

Limitations—Binge eating constructs, particularly in the context of subjectively large episodes, are challenging to measure reliably. Few studies addressed overeating in the absence of LOC, thereby limiting conclusions about the validity of the overeating construct independent of LOC. Additional studies addressing the discriminant validity of both constructs are warranted.

Discussion—Suggestions for future weight-related research and for appropriately defining binge eating in the eating disorders diagnostic scheme are presented.

Keywords

Binge eating; loss of control; overeating; validity

Binge eating and overeating are two prevalent obesity-related phenotypes that contribute to excess energy intake and weight gain.[1] Binge eating is characterized by the subjective experience of loss of control (LOC) while eating, irrespective of the actual amount of food consumed. Overeating is characterized by eating a large amount of food, irrespective of LOC. Therefore, LOC and overeating are two independent but inter-related constructs.

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In addition to being associated with weight-related characteristics, binge eating is a hallmark feature of eating disorders, which affect up to 5% of the population.[2] An additional 10–15% of individuals in the community report LOC and overeating behaviors that fail to meet the size and/or frequency thresholds for these diagnoses.[3,4] Because LOC and overeating lie at the intersection of obesity and eating disorders, researchers have studied these constructs more closely over the past several decades.

Research suggests that LOC is uniquely related to weight-related and psychosocial outcomes, while overeating may best be conceptualized as a marker of risk for excess weight gain and obesity.[5] However, both constructs have been difficult to operationalize and measure reliably because of their complexity and variability in phenotypic presentation. The current paper critically reviews the human literature supporting and challenging the validity of binge eating constructs. Studies related to face, convergent, discriminant, and predictive validity of LOC and overeating are described and synthesized with the goal of highlighting major gaps in the literature and emphasizing priorities for future research.

Methods

Searches of PUBMED and PSYCINFO were conducted between November, 2015 and July, 2016 to identify peer-reviewed articles published in English-language journals. No start date was enforced in the search. Search terms included, “loss of control,” “overeating,” “binge eating,” “objective,” “subjective,” and “large.” Reference lists of identified articles were also searched to locate additional studies.

To address whether LOC and overeating are uniquely valid constructs, special efforts were made to identify studies that investigated LOC *irrespective of episode size*, and overeating *irrespective of LOC*. Thus, four types of binge eating and overeating episodes were assessed:[6] *objective binge eating* (OBE) involving consumption of an unambiguously large amount of food accompanied by LOC; *subjective binge eating* (SBE) involving LOC while eating an amount of food that is deemed excessive by the respondent, but is not unusually large according to clinical rating standards; *objective overeating* (OO) involving consumption of an unambiguously large amount of food in the absence of LOC; and *subjective overeating* (SO), involving consumption an amount of food that is considered excessive by the respondent, but is not unusually large by clinical rating standards, in the absence of LOC (see Figure 1).

Data addressing face validity (the degree to which the measurement of a construct reflects what it is purported to measure) were included if they pertained to individuals’ appraisals of their own or others’ LOC and/or overeating behaviors. Data concerning convergent validity (the extent to which a construct is related to other constructs to which it should theoretically be related) and discriminant validity (the extent to which a construct empirically differs from theoretically unrelated constructs) were included if they pertained to cross-sectional associations among binge eating constructs and other anthropometric, psychosocial, or behavioral constructs. Data addressing predictive validity (the degree to which a construct predicts meaningful outcomes) were included if they referred to longitudinal outcomes of binge eating constructs, that is, if assessment of binge eating constructs preceded assessment

of relevant outcomes. EMA data were included with studies of convergent validity, rather than studies of predictive validity, because although analysis of EMA data is often prospective in that it assesses momentary antecedents and consequences of binge eating constructs, extant EMA studies of binge eating constructs are focused on capturing a cross-section of experiences as opposed to investigating how these constructs longitudinally predict experiential outcomes. Across validity domains, studies that did not attempt to parse the unique effects of LOC and overeating (e.g., comparisons of individuals with BED and healthy controls, which are confounded by size, frequency, and duration criteria for the disorder) were not included.

This review focuses primarily on studies of children and adults with overweight and obesity. However, given the relevance of binge eating constructs to eating disorders classification, studies conducted in eating disordered samples are also included. Although analogue studies have been developed to approximate binge eating in animals,[7] these studies were beyond the scope of this review and thus were not included.

Assessment

In order to facilitate an understanding of the ways in which the validity of LOC and overeating have been explored, a detailed description of current methods for measuring binge eating constructs is provided in Table 1. In short, binge eating constructs are most commonly assessed via semi-structured interviews and self-report measures, the latter of which includes pencil-and-paper questionnaires, self-monitoring records, and ecological momentary assessment (EMA). Directly observing binge eating constructs via feeding laboratory paradigms is an alternate methodology that avoids many of the biases inherent in assessments based upon self-report. Emerging research suggests that psychophysiological assessment may also be useful in directly observing objective, in vivo markers of binge eating constructs.

Results

Face Validity

A total of 8 adult and 2 pediatric studies addressing the face validity of LOC and overeating were identified; results of these studies are summarized in Table 2. 75–90% of adults identified LOC as critical in their personal appraisals of binge eating, and 43–90% identified overeating.[8–10] LOC was identified less frequently than overeating in personal definitions of binge eating among college students and adolescents.[11–13] Factors that influenced binge ratings included BED status, gender of raters and models, and sample composition (e.g., lay persons, clinicians).[11,14–16]

Convergent Validity

A total of 39 adult and 26 pediatric studies addressed the convergent validity of LOC and overeating; results are summarized in Table 3.

Anthropometric factors—A total of 17 adult and 16 pediatric studies reported on anthropometric characteristics in relation to LOC and/or overeating.

Adults: Of seven adult studies involving controls with no eating pathology, three reported that those with LOC and/or overeating had elevated BMIs relative to those with no LOC or overeating pathology.[17–19] However, in two of these studies, BMI differences were found only for those with OBE and not those with SBE.[18,19] By contrast, four studies found that BMI did not differ in individuals with LOC and/or overeating compared to those with no LOC or overeating pathology.[20–23] One adult study reported elevated %trunk fat, but not total %body fat or %abdominal fat, in those with LOC relative to those without LOC.[24] Of 11 adult studies directly comparing those with different forms of LOC and/or overeating, 6 found that OBE, SBE, and/or OO did not differ on BMI,[19,22,25–28] while 5 found that BMI was higher in those with OBE relative to those with SBE.[17,18,29–31] One adult study reported that BMI was correlated with OBE but not OO frequency,[32] while another reported no associations between LOC eating frequency and any anthropometric variables.[24]

Youth: Of 16 pediatric studies involving controls with no LOC or overeating pathology, 13 found that indices of cardiovascular risk, including BMI and overweight status, were elevated in youth with OBE and/or SBE relative to healthy controls.[3,33–45] Of note, in one of these studies, differences in weight status held only for males and not females.[33] By contrast, three studies reported no differences in those with OBE, SBE, and/or OO relative to those with no LOC.[46–48] Seven pediatric studies reported that individuals with OBE did not differ from those with OO[3,33,46] or those with SBE[37–39,49] on BMI. Four studies that compared those with OBE and/or SBE to those with OO reported higher BMI in the former than the latter,[38,39,43,44] with the exception that Tanofsky-Kraff and colleauges[39] reported that youth reporting SBE were similar to those reporting OO on BMI. No pediatric studies reported BMI differences between those with OBE and those with SBE. Finally, 5 pediatric studies reported that youth with OO did not differ from controls on BMI,[38,39,44,46] while 3 reported that those with OO had higher BMIs/rates of overweight or obesity than controls (although again, in one study,[33] these results pertained only to males).[3,33,43]

Psychosocial factors—A total of 21 adult and 15 pediatric studies reported on cross-sectional associations between binge eating constructs and psychosocial factors, including eating-related and general psychopathology, quality of life, personality, and interpersonal functioning.

Adults: Of the 21 adult studies, 8 included a control group with no LOC or overeating pathology. All 8 of these studies reported more severe impairment among those with OBE and/or SBE relative to those with no LOC or overeating on at least one index of psychosocial functioning.[17–23,30] Of 13 adult studies directly comparing individuals with different forms of LOC and/or overeating, 12 found that those with OBE endorsed similar levels of psychosocial impairment as compared to those with SBE across most measures,[18,19,25–31,50–52] while 1 reported greater impairment in those with OBE relative to those with SBE.[17] However, the OBE group in this latter study was comprised of individuals with BED; thus, it is unclear whether psychosocial differences were attributable to episode size, frequency, or other diagnostic features of BED. Of only two adult studies reporting on psychosocial functioning in individuals with OO, both found that these individuals endorsed lower impairment than those with LOC, and comparable impairment as compared to those

with no eating pathology, on most measures of distress.[19,22] Generally, correlations between OBE and SBE frequency and measures of psychosocial impairment were in the moderate to large range.[53–55]

Youth: Of the 15 pediatric studies, 13 included a control group with no LOC or overeating pathology. Of these, all 13 studies reported more severe impairment among those with OBE and/or SBE relative to those with no LOC or overeating on at least one index of psychosocial functioning.[3,33–36,38,43–46,48,56,57] There tended to be fewer differences between youth with LOC and controls with no LOC or overeating pathology on measures of dietary restraint[48,56] and personality.[57] All six pediatric studies directly comparing individuals with different forms of LOC and/or overeating found that those with OBE endorsed similar levels of psychosocial impairment as compared to those with SBE across most measures;[35,38,46,48,49,58] youth with OBE reported greater psychosocial impairment than those with SBE on very few measures.[48] Of six pediatric studies reporting on psychosocial functioning in individuals with OO, three found that these individuals endorsed lower impairment than those with LOC, and similar levels of impairment as compared to those with no eating pathology, on most measures of distress.[38,43,46] Three studies reported that youth with OO endorsed similar impairment as those with LOC, and/or greater psychosocial impairment than those with no eating pathology on most psychosocial measures.[3,33,44]

Momentary data: In addition to these distal cross-sectional associations, multiple studies of distress and binge eating constructs have found that LOC frequently occurs *in response to* negative emotions.

Adults: In adults, one self-report study reported that SBE frequency was correlated with self-reported emotional eating tendencies in individuals with AN-binge/purge subtype, and OBE frequency was correlated with emotional eating tendencies in individuals with BN.[55] Data from three independent EMA studies, one dietary recall study, and one laboratory-based study of adults indicated that LOC, particularly in the context of OBE, was associated with elevated pre- and post-episode negative affect pre-episode.[59–65] Two adult EMA studies, both of which involved adults with obesity, reported on OO in relation to momentary distress. One of these studies found that that negative affect was not increased prior to OO.[65] The other found that pre-episode negative affect was unrelated to energy intake, a potential proxy for OO; post-episode negative affect was related to energy intake in obese individuals without BED, but was unrelated to energy intake in those with BED.[61]

Youth: Three out of three pediatric self-report studies suggested that LOC eating was associated with eating in response to negative affect,[39,41,48] although in one of these studies, associations were only significant for youth with OBE and not SBE.[48] Of two laboratory-based studies reporting on negative affect in youth with LOC eating, one found that negative mood ratings predicted the degree to which youth reported LOC during a subsequent test meal,[47] while the other found no association between energy intake and negative affect.[66] Of two EMA studies of negative affect, both reported that negative affect did not precede LOC eating in adolescents.[67,68] In one of these studies, happiness was found to be lower during

both binge and normal meals of youth with LOC eating relative to random signal events prompted by the investigators, and sadness was higher on binge days in youth with LOC eating relative to non-binge days of youth without LOC eating.[67] Cognitive, stress-related, and interpersonal factors may be more consistently associated with LOC eating episodes in youth.[67–69]

Eating behavior

Adults: A total of 12 adult studies reported on eating behavior in relation to LOC and/or overeating (as approximated by energy intake), including 5 respondent-based[17,59,62,63,70] and 7 laboratory-based studies.[64,71–76] The one study[17] that specifically investigated binge eating constructs among individuals with eating pathology relative to controls with no eating pathology reported higher overall energy intake in those endorsing LOC and/or overeating relative to controls. Four out of four studies reported that degree of control over eating was highly correlated with energy intake during a self-reported or laboratory-based meal.[62–64,75] OBE episodes were associated with greater energy intake than SBE in two out of two studies.[17,70] Binge meals were associated with greater energy intake than non-binge meals in six out of six studies,[71–76] but, with one exception,[72] these findings only applied to individuals with eating disorders and not to healthy controls.

Youth: A total of six pediatric studies reported on eating behavior in relation to LOC and/or overeating, including three respondent-based[39,42,67] and three laboratory-based studies.[40,47,77] Of five studies generally comparing energy intake in youth with LOC relative to non-LOC controls, three reported no differences between the former and the latter[40,42,47] and two reported greater energy intake in youth with LOC relative to controls[67,77] (although in Hilbert and colleagues' 2010 study, differences were reported only during a child-only snack meal). Meals involving LOC were associated with greater energy intake than non-LOC meals in two out of two studies.[40,67]

Adult and pediatric findings regarding other eating behavior-related variables, such as macronutrient composition, hunger, and satiety, are reported in Table 3.

Discriminant Validity

There were no studies that directly addressed the discriminant validity of binge eating constructs.

Predictive Validity

A total of 9 adult and 8 pediatric studies reported on the predictive validity of binge eating constructs; results of these studies are summarized in Table 4.

Adults—Of the 9 adult studies reporting on the predictive validity of specific binge eating constructs, 8 were conducted in the context of an intervention. Of four studies reporting on weight-related outcomes following psychological or surgical treatment, three found that baseline OBE, SBE, and/or OO were not predictive of weight change,[23,78,79] and one found that baseline LOC predicted lower weight re-gain in underweight individuals with eating disorders.[18] In one study, LOC eating following bariatric surgery was predictive of lower

weight loss at subsequent time-points.[23] Of two studies directly comparing binge eating constructs, one found equivalent weight outcomes in those reporting OBE relative to those reporting SBE,[18] while the other found OBE to be associated with greater weight gain than SBE.[30]

In terms of psychosocial outcomes, findings have been mixed. In one study, baseline OBE predicted placebo non-response while baseline SBE predicted placebo response; OO was equivalent among placebo responders and non-responders.[80] One study found higher baseline SBE frequency to be predictive of non-remission from an eating disorder,[81] while another found OBE, but not SBE, to predict remission status.[82] Finally, while two studies reported that individuals with OBE and SBE generally did not differ from one another or from controls with no LOC eating in terms of changes in eating-related and general psychopathology,[18,30] another found that changes in SBE, but not OBE, predicted changes in eating-related and general psychopathology during and after psychological treatment.[83]

Youth—Of eight pediatric studies reporting on the predictive validity of specific binge eating constructs, three were conducted in the context of an intervention. In terms of weight-related outcomes, weight gain was found to be unrelated to LOC eating in four naturalistic or intervention studies,[35,56,84,85] while three other studies found that LOC eating predicted poorer weight-related outcomes.[4,86,87] OO was not associated with elevated risk for adverse weight outcomes in the single study that reported on this construct.[4] LOC eating was associated with poorer psychosocial outcomes, including onset of BED, in most studies,[4,85,88] although these associations may not hold up over longer periods of time.[84]

Discussion

Emerging evidence supports the validity of binge eating constructs, particularly LOC. Overall, the literature suggests that LOC is a psychopathology construct that is uniquely associated with distress and impairment, disturbed eating behavior, and weight-related factors in both cross-sectional and prospective studies, independent of episode size and body weight. Although research on overeating independent of LOC is underrepresented, overeating may best be conceptualized as a marker of risk for excess body weight.

Summary and Interpretations

Studies generally supported the face validity of binge eating constructs by demonstrating the importance of LOC and overeating in individuals' appraisals of binge eating. However, results were more consistent in adults than in college students and adolescents, who tended to highlight overeating, but not LOC, as central in their appraisals. Thus, it is crucial to consider developmental factors involved in determining the core attributes of binge eating. Such factors may include one's ability to understand the meaning of LOC and overeating, and eating-related social comparisons specific to one's peer group.

Support for the convergent validity of LOC in adults was strong for psychosocial and eating-related factors, but mixed for anthropometric characteristics, which may be a function of differing samples. Associations between LOC and body weight were stronger, and less influenced by episode size, among treatment-seeking relative to community-based adults,

which may reflect a tendency for individuals with more severe conditions to present in clinical settings;[89] therefore, associations between binge eating and increased body weight may be accounted for by the greater *severity* of binge eating seen in clinical samples, whereas these associations may be less clear in non-clinical samples in which binge eating may be less severe when present. OBE and SBE were indistinguishable on most measures of psychosocial functioning, suggesting that LOC, irrespective of overeating, may be driving associations between binge eating and distress/impairment; however, some recent research indicates that assessing episode size adds incremental value to the convergent validity of LOC.[90] The convergent validity of the overeating construct, independent of LOC, was not addressed in most studies.

Pediatric LOC was consistently related to indices of increased body weight and psychosocial impairment, while results for overeating were less consistent in youth. LOC did not consistently track with youth's energy intake, which may be related to developmental differences in energy intake associated with LOC episodes, perhaps due to varying nutritional needs[91] and differing access to energy dense foods[92] in children as compared to adults. However, LOC eating was marked by differences in the composition of eating episodes, suggesting that the experience of LOC in youth may manifest in differing food choices rather than overall increased energy intake.

There were limited data addressing the discriminant validity of LOC and overeating, which may partially reflect a bias against publishing null findings.[93] However, it is worth noting that LOC appears distinct from other eating- and weight-related problems. Although LOC may overlap to some extent with overeating and other forms of disinhibited eating (e.g., eating in the absence of hunger), research in adults[22,59,94] and children[38,46,95] suggests that these are distinct constructs with distinct correlates. Indeed, research has shown that the frequency of OBE episodes is unrelated to the frequency of SBE episodes (r range=.08–.22),[54,96] suggesting that LOC and overeating are distinct constructs.

Finally, most, but not all, of the studies reviewed supported the predictive validity of LOC in relation to treatment outcome and naturalistic eating- and weight-related outcomes. An additional point to consider is that several studies have shown that *persistent* LOC eating is associated with adverse health outcomes in youth;[84,88] similarly, in the bariatric surgery literature, post-surgical LOC eating has been concurrently associated with poorer weight outcomes in adults.[97] While these studies do not fit neatly into the domain of predictive validity as they are not truly prospective in nature, they provide additional support that LOC eating is associated with adverse health-related outcomes across the age spectrum. Finally, as with other validity domains, the predictive validity of OO has been underexplored. Research is also needed to clarify the impact of specific binge eating constructs on treatment outcome in youth.

Limitations

Measurement issues comprise the major limitation of this review. For example, overeating was approximated corresponding to energy intake for multiple studies. This is an imperfect proxy since the objectively large/not large distinction is determined by the quantity, not quality or density, of food. Thus, an objectively large episode could contain relatively few

calories (e.g., 5 apples) while a subjectively large episode could be calorically dense (e.g., typical fast food meal). More generally, the modest reliability of LOC and overeating is an issue that has been raised by other investigators,[98] and represents a point of concern for this review since poor reliability can distort interpretations of validity. The modest reliability of the LOC construct may reflect the inherent difficulty of having participants recall momentary constructs that naturally vary over time and are associated with negative affect and current dietary patterns, and of attempting to obtain precise details about features of LOC and overeating episodes that may or may not be important in identifying their presence (e.g., actual/subjective episode quantity, duration, context). Ultimately, the behavioral aspects of LOC and overeating, while potentially easier to identify, appear to be less important than one's subjective experience during such episodes, the latter of which is fundamentally more difficult to assess. Therefore, future research on binge eating constructs should seek to improve its measurement in the service of enhanced reliability. Finally, as with other literature reviews, the data described herein may be subject to biases in the peer review system (e.g., publication bias, selective reporting). Therefore, results should be interpreted cautiously.

Future Directions

Several areas related to our understanding of LOC and overeating require additional research. First, sociocultural differences, particularly those related to gender and race/ethnicity, in the presentation of LOC and overeating are underexplored, which is problematic since binge eating is more evenly distributed across these domains than other eating disorder behaviors.[2–4] Second, the limited data on OO and, to an even greater extent, SO has impeded attempts to tease apart the independent contributions of LOC and perceived/actual overeating to weight- and eating-related outcomes. Previous research has suggested that LOC may be confounded by episode size,[62] and as a result, it is unclear whether LOC drives eating behavior, or problematic interpretations of one's eating behavior (e.g., breaking a dietary rule) drive subjective reports of LOC. It is also unclear why OO or SO may occur in the absence of LOC on some occasions but not others, sometimes within the same individual. This lack of clarity has clinical implications in terms of focusing treatments on enhancing control over eating, versus improving problematic perceptions about eating behavior.

Third, it is unclear whether LOC—especially while consuming a subjectively large amount of food—is related to a general tendency to pathologize one's behaviors and experiences, which may explain cross-sectional associations between LOC and psychopathology. Relatedly, eating disorders involving LOC and other disorders characterized by self-control impairments frequently co-occur,[2] but it is unclear whether the underlying experience of LOC is similar across behavioral phenotypes. Indeed, this issue has been raised in regard to the controversial "food addiction" construct,[99] a distinct but potentially overlapping construct relative to binge eating. Therefore, a critical yet unanswered question in the literature is the extent to which LOC is specific to eating behavior, or whether the construct represents generalized pathology extending to multiple reinforcers. Inter-disciplinary cross-talk will be critical in starting to answer this question, as differing labels (e.g., "addiction,"

"self-control") used to describe potentially similar constructs may impede the growth of new knowledge regarding how to study and treat behavioral problems.

A fourth research gap is related to the limited assessment of objective markers of the momentary occurrence of LOC and overeating. A significant impediment to identifying biomarkers of these phenomena is that reliable methods for eliciting LOC in particular are limited. Feeding laboratory studies often involve instructing participants to engage in binge eating episodes, and this methodology is fairly consistently associated with objective changes in eating behavior as compared to instructing participants to engage in eating a normal meal, as reviewed in Table 3. However, systematic collection of other objective data in such studies has been limited, thereby impeding knowledge on the extent to which these objective measures are linked specifically to LOC, overeating, or their confluence, and the unique influence of these constructs on weight regulation. Future directions include developing effective methods for eliciting LOC eating across laboratory-based paradigms, including using proxy designs to simulate LOC eating, and more programmatically assessing biomarkers in other momentary data collection designs.

A final point concerns the classification scheme for eating disorders. DSM-5 requires OBE for diagnoses of BED and BN, while individuals reporting SBE in the absence of OBE are relegated to a residual "otherwise specified" category.[100] Given that LOC is a valid construct that is uniquely related to psychopathology independent of overeating, this author would argue that both OBE and SBE should be accounted for in the diagnostic scheme. Several investigators have proposed independent diagnoses which would accommodate individuals who engage in SBE (e.g.,[101]). A more parsimonious alternative might be to relax the DSM binge eating criterion to include both OBE and SBE, as is likely for ICD-11.[102] Alternatively, eliminating size-related distinctions all together may be optimal for future diagnostic schemes, especially given evidence that OBE and SBE episodes are similarly predictive of distress, impairment, and other health-related outcomes. Further diagnostically relevant research will hopefully clarify these taxonomic issues.

Ultimately, developing and implementing efficacious interventions for binge eating-related problems across the size and LOC-severity spectrum should be a priority. Research has shown that SBE may be less responsive than OBE to psychological treatments addressing behavioral and affective antecedents,[26,83] suggesting that there may be unique triggers of LOC in the absence of overeating that aren't adequately addressed in current interventions. Treatments focused on improving distorted cognitions about one's eating behavior (e.g., subjective perceptions that one has eaten an excessive amount of food, which may be related to the experience of LOC)[62] as well as increasing mindfulness/intuitive eating practices to enhance awareness of subjective and objective cues around eating and avoid common LOC triggers[103] may be particularly helpful.

In summary, accumulating evidence suggests that LOC is a valid construct despite evidence of its modest reliability, particularly when accompanied by subjectively large amounts of food. Overeating appears to be best considered as a potential marker for excess weight. Future research should focus on clarifying the phenomenology, measurement, and unique

outcomes of these constructs to inform prevention/early intervention and classification efforts.

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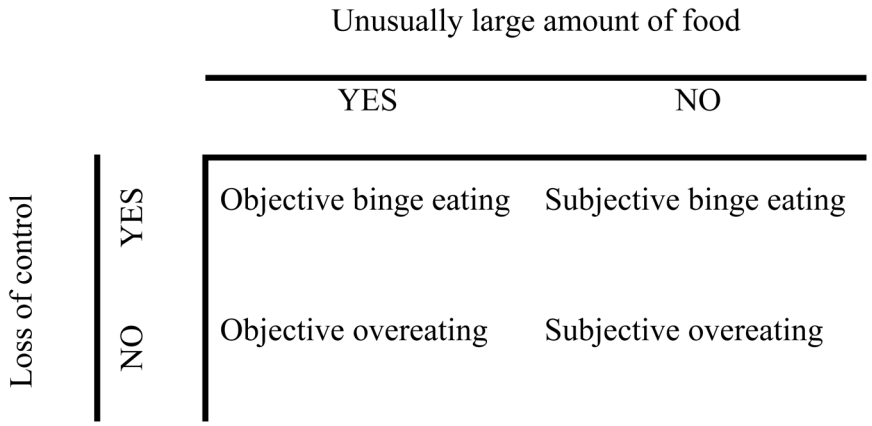

Figure 1.
Matrix of binge eating constructs

Table 1

Description of tools for measuring binge eating constructs

Domain	Description	Strengths		Limitations		Measures			
Respondent-based measures									
						Title	**Age**	**Sample items**	
Semi-structured interviews	Trained assessors rate behavioral, cognitive, and affective experiences based on information provided by respondents	•	Interviewers can be trained to standardization	•	Time-consuming	Eating Disorder Examination[6]	14+ *	•	I would like you to describe any times when you have felt that you have eaten too much at one time.
				•	Extensive training required to administer			•	When you were eating, did you have a sense of loss of control at the time?
				•	Rely on retrospective recall	Eating Disorders Assessment for DSM-5[104]	18+	•	Were there times in the last 3 months when you felt out of control and consumed what was clearly a large amount of food?
				•	May be costly	Structured Clinical Interview for DSM-IV-TR Axis I Disorders: Patient Edition[105]	18+	•	Have you often had times when your eating was out of control?
								•	During these times, do you often eat within any 2 hour period what most people would regard as an unusual amount of food?
						Structured Interview for Anorexic and Bulimic Syndromes[106]	18+	•	Did you experience episodes of binge eating during which you ate a large amount of food in a relatively short period of time in the last 3 months or in the past?
								•	Did you experience a sense of lack of control over your eating behavior during the binges in the last 3 months or in the past?
Self-report questionnaires	Respondents read and independently respond to written questions	•	Low cost	•	Rely on subjective self-report	Binge Eating Scale[107]	18+	•	(a) I usually am able to stop eating when I want to. I know when “enough is enough;” (b) Every so often, I experience a compulsion to eat which I can’t seem to control; (c) Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges; (d) I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily.
		•	Rapid administration	•	May lack consistency since perceptions of eating-related constructs may vary within and across individuals				

Domain	Description	Strengths	Limitations	Measures		
Respondent-based measures						
				Title	**Age**	**Sample items**
				Eating Attitudes Test[108]	11–18 *	• I have gone on eating binges where I feel that I might not be able stop… always, very often, often, sometimes, rarely, never.
				Eating Disorder Diagnostic Scale[109]	13–65	• During the past 6 months have there been times when you felt you have eaten what other people would regard as an unusually large amount of food (e.g., a quart of ice cream) given the circumstances? • During the times when you ate an unusually large amount of food, did you experience a loss of control (feel you couldn't stop eating or control what or how much you were eating)?
				Eating Disorder Examination-Questionnaire[110]	16+ *	• During how many of the past 28 days have there been times when you have eaten what most people would regard as an unusually large amount of food? • During how many of these episodes of overeating did you have a sense of having lost control?
				Questionnaire on Eating and Weight Patterns[111]	18+ *	• During the past three months, did you ever eat, in a short period of time--for example, a two hour period-- what most people would think was an unusually large amount of food? • When you ate a really big amount of food, did you ever feel that you could not stop eating?
				Loss of Control Over Eating scale[112]		• In the last four weeks (28 days), how often have you had the following experiences during a time when you were eating?... My eating felt like a ball rolling down a hill that just kept going and going.
				Eating Loss of Control scale[113]	18+	• During the past four weeks, how many times have you felt helpless to control your eating urges? • During the past four weeks, how many times have you felt out of control and eaten an unusually large amount of food

Domain	Description	Strengths	Limitations	Measures			
Respondent-based measures							
				Title	**Age**	**Sample items**	
							(for example, eating two full meals; or eating three main courses; or eating an unusually large amount of one food or combination of foods) in a short period of time (1–2 hours)?
Self-monitoring	Respondents record the occurrence of target behaviors and their correlates in the natural environment	• Minimal retrospective recall biases • Constructs assessed in natural environment • May be paired with objective sensors of eating behavior	• Rely on subjective self-report • Costly • Burdensome to complete at frequent intervals	• Paper-and-pencil records • Ecological momentary assessment			
Laboratory-based measures							
Feeding laboratory paradigms	Standardized test meals designed to model LOC and/or overeating episodes administered under controlled conditions	• Fewer self-report biases • Tighter control over confounds • Ability to experimentally manipulate variables related to binge eating constructs	• Costly • Limited ecological validity	• Energy intake • Macronutrient content • Meal duration • Bite velocity			
Physiological assessment	Physiological responses tracked during exposure to real or imagined food-related cues	• Minimizes many self-report biases • Elucidates potential mechanisms underlying binge eating constructs • Assesses activity in real time	• Costly • Difficult to elicit LOC and overeating in most psychophysiological paradigms • Limited ecological validity • May yield large amount of false positives	Neuroimaging		• Functional magnetic resonance imaging • Computed tomography • Positron emission tomography • Electroencephalography • Magnetoencephalography • Near infrared spectroscopy	
				Eye-tracking		• Pupillometry • Eye movement • Eye blink response	
				Other		• Electrodermal activity	

Domain	Description	Strengths	Limitations	Measures		
Respondent-based measures						
				Title	**Age**	**Sample items**
						• Cardiovascular activity • Muscular activity

Abbreviations: LOC=loss of control

*Also available in formats adapted for youth.

Table 2

Summary of studies assessing the face validity of binge eating constructs

Reference	Sample	*n*	% female	Age	BMI	Procedure	Summary of main findings
Adults							
[10]	TS: family practice patients	243	100	26.6±5.5	NR	Participants completed EDE and a subset defined binge eating in their own words	83% of EDE-defined OBE labeled as binges 42% of EDE-defined SBE labeled as binges 19% of EDE-defined OO labeled as binges 13% of EDE-defined SO labeled as binges 93% of participants required large amount of food to classify binge episodes 90% of participants required LOC to classify binge episodes
[9]	TS: bariatric surgery	197	100	39.8±11.2	43.0±6.7	Eating and Exercise Examination interview for quantity/quality of eating episodes	LOC predicted self-reported binge eating (B=.16, t=5.19 ***) Of women who self-reported binge eating: 75% reported associated LOC; 25% did not report associated LOC; 61% reported consuming ≥6 or more servings of food; 19% reported consuming 1–4 servings of food Of women who self-reported overeating, 22% reported associated LOC but did not define episodes as binge eating
[114]	NTS: college students	99	76.8	25.5	NR	Vignettes of a model eating varied according to quantity, duration, and LOC, and rated on binge scales	Larger size [t(95)=340.05 ***] and LOC [t(98)=119.10 ***] predicted judgements of episodes as binges
[14]	NTS: community-based	48	100	38.9±11.4	34.6	Participants recorded type/amount of food and duration of eating episodes for 3 weeks; peer and dietitian judges rated randomly selected eating episodes as binges or non-binges	Peer judges more likely than dietitians to label eating episodes as binges for participants with full- (z=4.61 ***) and subthreshold BED (z=3.09 **) Peer κ=.39 Dietitian κ=.44 Peer vs. dietitian κ=.40–.48 Participants vs. peer and dietitian κ=.07–.19
[15]	NTS: community-based with BED	23	95.7	44.7±10.9	NR	Vignettes of a model eating varied according to quantity, duration, and LOC, and rated on binge scales	Episodes involving a large quantity of food [F(1,80)=374.93 **] or LOC [F(1,80)=109.90 ***] rated as more binge-like Episodes rated as more binge-like if a large amount of food consumed when LOC was present [F(1,80)=3.95 *] Participants with BED rated vignettes involving large amounts of food higher on binge scale compared to undergraduates [F(2,80)=4.92 **]
	NTS: mental health professionals	34	50.0	30.2±2.2			
	NTS: college students	25	88.0	40.2±8.1			
[16]	NTS: college students sample 1	238	70.0	20.2±3.0	22.3±3.7	Videotaped eating episodes varied according to model's gender and quantity of food, and rated as binges/non-binges	Larger size predicted judgements of episodes as binges [Wald χ^2(1)=21.22 ***]
	NTS: college students sample 2	139	66.0	19.8±2.8	22.4±3.0		

Reference	Sample	*n*	% female	Age	BMI	Procedure	Summary of main findings
	NTS: college students sample 3	83	59.0	20.6±3.7	23.0±3.4		
[11]	NTS: college students	969	64.0	Range=18–40+	NR	Participants asked to define binge eating in their own words	~10–25% of participants endorsed LOC as necessary to define a binge; ~65–75% identified quantity of food consumed as necessary to define a binge Individuals with BED identified LOC in defining a binge more frequently than those without BED [$\chi^2(1)=6.57^{*}$] Males and females with and without BED were similarly likely to identify quantity in defining a binge
[8]	NTS: community-based with BED	60	100	42.7±9.9	36.2±8.4	Participants asked to define binge eating in their own words and independent raters coded responses for presence/absence of binge features	82% of participants included LOC in binge eating definition 43% of participants included eating a large amount of food binge eating definition
Youth							
[12]	NTS: school-based	259	41.7	14.7	NR	Participants asked to define binge eating in their own words	72.2% of participants defined binge eating exclusively in terms of quantity of food eaten 12.9% of participants defined binge eating in terms of quantity, duration, and LOC
[13]	NTS: community-based adolescent/mother dyads	19	100	14.5±1.2	NR	Focus groups with adolescents who reported LOC eating via phone screen	Few participants directly endorsed LOC or binge eating Binge eaters described as “lacking self control” LOC associated with eating sneakily, negative affective antecedents, short-term relief

Abbreviations: BMI=body mass index (kg/m^2); TS=treatment-seeking; NR=not reported; EDE=Eating Disorders Examination; OBE=objective binge eating; SBE=subjective binge eating; OO=objective overeating; SO=subjective overeating; LOC=loss of control; NTS=non-treatment seeking; BED=binge eating disorder

* $p \leq .05$

** $p < .01$

*** $p < .001$

Table 3

Summary of studies assessing the convergent validity of binge eating constructs

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	Method	
Respondent-based								
Adults								
[70]	NTS: obese with BED	12	100	37.9±7.8	39.6±6.2	Energy intake	Interview	OBE>SBE (t=2.71*)
						% energy from carbohydrate	Interview	OBE>SBE (t=2.79*)
						% energy from fat	Interview	OBE=SBE (t=2.20)
						% energy from protein	Interview	OBE=SBE (t=0.38)
[24]	TS: college students enrolled in weight gain prevention program	294	100	18.2±0.4	23.7±2.9	BMI	Measured	LOC frequency, r=−.03
						Total % body fat	Measured	LOC=no-LOC; LOC frequency, r=.04
[50]	TS: AN	471				Eating-related psychopathology	Self-report	OBE=SBE (F=1.87)
	TS: BN	836				Eating-related QOL	Self-report	OBE=SBE (F=3.42)
	TS: EDNOS	845	97.6	25.9±7.7	NR	Negative affect	Self-report	OBE=SBE (F=0.00)
	TS: BED	202				Global functioning	Self-report	OBE=SBE (F=0.93)
						Negative self-image	Self-report	OBE=SBE (F=0.21)
[25]	Mixed TS/NTS: BN	144				BMI	Self-report	OBE-only=SBE-only
						Eating-related psychopathology	Self-report	OBE-only=SBE-only [F(1,66)=0.96]
						Compensatory behaviors	Self-report	OBE-only=SBE-only [F(4,63)=0.90]
	Mixed TS/NTS: subthreshold BN	60	100	25.7±8.8	22.9±5.2	Negative affect	Self-report	OBE-only=SBE-only [F(2,64)=2.25]
						Interpersonal problems	Self-report	OBE-only=SBE-only [F(2,65)=2.11]
						Impulsivity	Self-report	SBE-only>OBE-only [F(3,64)=3.42*]
[17]	TS: bariatric surgery	180	78.3	44.8±11.2	44.5±6.8	BMI	Self-report	BED>SBE>no-LOC*
						Body image distress	Self-report	BED>SBE>no-LOC*
						Eating-related distress	Self-report	BED>SBE>no-LOC*
						Restraint	Self-report	BED=SBE=no-LOC

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	TS: weight loss support group	93	91.4	55.1±12.4	32.7±7.3	Disinhibition	Self-report	BED>SBE>no-LOC *
						Hunger	Self-report	BED>SBE>no-LOC *
						Depression	Self-report	BED, SBE>no-LOC *
						Mental QOL	Self-report	BED>SBE, no-LOC *
	NTS: community-based	158	78.5	41.3±13.5	24.8±5.1	Physical QOL	Self-report	BED=SBE; SBE=no-LOC; BED>no-LOC *
						Energy intake	Self-report	BED>SBE>no-LOC *
						Carbohydrates	Self-report	BED>SBE>no-LOC *
						Fat	Self-report	BED>SBE, no-LOC *
						Protein	Self-report	BED>SBE, no-LOC *
[18]	TS: underweight eating disorders with OBE	33	100	27.9±6.9	15.4±1.6	BMI	Measured	OBE>SBE, no-LOC (F=8.14 **)
						Eating-related psychopathology	Interview	OBE, SBE>no-LOC (F=4.60 *)
						Depression	Self-report	OBE=SBE=no-LOC (F=1.07)
						Anxiety	Self-report	OBE=SBE=no-LOC (F=1.14)
	TS: underweight eating disorders with SBE	36		25.8±10.5	14.0±1.3	Novelty seeking	Self-report	OBE=SBE=no-LOC (F=2.85)
						Harm avoidance	Self-report	OBE=SBE=no-LOC (F=0.50)
						Reward dependence	Self-report	OBE=SBE=no-LOC (F=0.32)
						Persistence	Self-report	OBE=SBE=no-LOC (F=1.95)
	TS: underweight eating disorders with no LOC	36		24.3±9.0	14.4±1.7	Self-directedness	Self-report	OBE, SBE<no-LOC (F=6.33 **)
						Cooperativeness	Self-report	OBE=SBE=no-LOC (F=2.93)
						Self-transecendence	Self-report	OBE=SBE=no-LOC (F=0.24)
[32]	TS: diabetes	274	65.0	52.5±12.1	33.9±6.9	BMI	Measured	Correlated with binge eating (r=.27 *) but not overeating
[20]	NTS: community-based with LOC	16	100	42.9±10.4	31.3±6.7	BMI	NR	LOC=no-LOC (t=−1.70)
	NTS: community-based without LOC	16		41.0±14.6	28.5±5.6	Eating-related psychopathology	Interview	LOC>no-LOC (t=−4.63 ***)
[53]	Mixed TS/NTS: PD	101	100	22.4±5.3	22.3±1.9	Restraint	Self-report	LOC frequency, r=−.22

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
						Disinhibition	Self-report	LOC frequency, r=.35 **
						Hunger	Self-report	LOC frequency, r=.29 **
						Body image	Self-report	LOC frequency, r=.21 *
						Eating-related psychopathology	Interview	LOC frequency, r=.20 *
						Mood disorder	Interview	LOC frequency, r=.16
						Anxiety disorder	Interview	LOC frequency, r=.23 *
						Substance use disorder	Interview	LOC frequency, r=.27 **
						Impulse control disorder	Interview	LOC frequency, r=.32 **
						Depression	Self-report	LOC frequency, r=.32 **
						State anxiety	Self-report	LOC frequency, r=.17
						Trait anxiety	Self-report	LOC frequency, r=.15
						Impulsivity	Self-report	LOC frequency, r=.07
						Negative urgency	Self-report	LOC frequency, r=.44 ***
						Lack of premeditation	Self-report	LOC frequency, r=.25
						Lack of perseverence	Self-report	LOC frequency, r=−.06
						Sensation-seeking	Self-report	LOC frequency, r=.20
						Eating-related QOL	Self-report	LOC frequency, r=.39 **
						Global functioning	Interview	LOC frequency, r=−.34 **
[28]	NTS: community-based with OBE, SBE, and vomiting (1)	30	100	24.3±5.4	22.7±2.3	BMI		1=2=3=4 (F=2.15)
	NTS: community-based with OBE (2)	86		24.7±5.4	25.7±6.0	Social functioning		1, 2>4 (F=8.94 ***)
	NTS: community-based with SBE (3)	30		25.2±5.4	26.7±6.2	Psychiatric distress		1>4 (F=6.05 ***)
	NTS: community-based with heterogeneous symptoms (4)	102		24.6±5.7	25.1±5.3	Self-esteem		1<4 (F=6.86 ***)
						Alcohol use		1=2=3=4 (F=0.15)
[19]	NTS: college students with OBE	52	100	19.3±1.5	23.5±4.5	BMI	Self-report	OBE>no pathology; OBE=SBE=OO; SBE=OO=no pathology [F(4,333)=9.2 **]

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	NTS: college students with SBE	40		19.1±0.8	22.1±3.6	Eating-related psychopathology	Self-report	OBE, SBE>OO, no pathology [$F(4,333)=49.7^{***}$]
	NTS: college students with OO	55		19.4±2.0	21.9±3.2	Psychiatric distress	Self-report	OBE, SBE>OO, no pathology [$F(4,332)=17.8^{***}$]
	NTS: college students with no pathology	145		19.3±2.3	21.7±3.2	Eating-related QOL	Self-report	OBE, SBE>OO, no pathology [$F(4,333)=48.3^{***}$]
[51]	NTS: BN	30		25.4±5.5	NR	Restraint	Self-report	OBE=SBE [$F(1,51)=2.0$]
						Cognitive restraint	Self-report	OBE=SBE [$F(1,51)=0.3$]
						Disinhibition	Self-report	OBE=SBE [$F(1,51)=2.5$]
						Hunger	Self-report	OBE=SBE [$F(1,51)=1.7$]
						Eating-related psychopathology	Self-report	OBE>SBE [$F(1,51)=11.1^{**}$]
						Binge frequency	Self-report	OBE>SBE [$F(1,51)=8.0^{**}$]
	NTS: BN with SBE	24	100	21.4±3.4	NR	Purge frequency	Self-report	OBE>SBE [$F(1,51)=8.3^{**}$]
						Depression	Self-report	OBE=SBE [$F(1,51)=0.6$]
						State anxiety	Self-report	OBE=SBE [$F(1,51)=0.0$]
						Trait anxiety	Self-report	OBE=SBE [$F(1,51)=0.0$]
						Alcohol use	Self-report	OBE=SBE [$F(1,51)=3.4$]
						Drug use	Self-report	OBE=SBE [$F(1,51)=1.8$]
						Impulsivity	Self-report	OBE>SBE [$F(1,51)=7.8^{**}$]
[54]	NTS: community-based with BED	18				Vomiting	Interview	OBE frequency, $r=.42^{**}$; SBE frequency, $r=.40^{**}$
						Laxatives	Interview	OBE frequency, $r=.22$; SBE frequency, $r=.05$
						Diuretics	Interview	OBE frequency, $r=.21^{**}$; SBE frequency, $r=.51^{**}$
						Driven exercise	Interview	OBE frequency, $r=.23^{**}$; SBE frequency, $r=.21^{**}$
			100	28.1±10.6	27.7±6.5	Restraint	Interview	OBE frequency, $r=.47^{**}$; SBE frequency, $r=.41^{**}$
						Eating concern	Interview	OBE frequency, $r=.51^{**}$; SBE frequency, $r=.44^{**}$
						Weight concern	Interview	OBE frequency, $r=.50^{**}$; SBE frequency, $r=.39^{**}$
						Shape concern	Interview	OBE frequency, $r=.53^{**}$; SBE frequency, $r=.40^{**}$
	NTS: community-based with BN	7				Depression	Self-report	OBE frequency, $r=.44^{**}$; SBE frequency, $r=.33^{**}$

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	NTS: community-based with subthreshold BN and BED	35				Anxiety	Self-report	OBE frequency, r=.46 **; SBE frequency, r=.36 **
						Stress	Self-report	OBE frequency, r=.53 **; SBE frequency, r=.38 **
						Drive for thinness	Self-report	OBE frequency, r=.46 **; SBE frequency, r=.44 **
						Interospective awareness	Self-report	OBE frequency, r=.49 **; SBE frequency, r=.30
						Bulimia	Self-report	OBE frequency, r=.69 **; SBE frequency, r=.32 **
						Body dissatisfaction	Self-report	OBE frequency, r=.33 **; SBE frequency, r=.27
						Ineffectiveness	Self-report	OBE frequency, r=.46 **; SBE frequency, r=.28
						Maturity fears	Self-report	OBE frequency, r=.15; SBE frequency, r=.30 **
	NTS: community-based with no eating pathology	21				Perfectionism	Self-report	OBE frequency, r=.15; SBE frequency, r=.08
						Interpersonal distrust	Self-report	OBE frequency, r=.24; SBE frequency, r=.18
						Cognitive restraint	Self-report	OBE frequency, r=.12; SBE frequency, r=.28
						Disinhibition	Self-report	OBE frequency, r=.53 **; SBE frequency, r=.26
						Hunger	Self-report	OBE frequency, r=.48 **; SBE frequency, r=.23
[115]	TS: AN	26				Physical QOL	Self-report	Variance for OBE=NS; variance for SBE: β=.38 *
	TS: BN	4						
	TS: BED	1	100	26.3±9.0	21.6±7.3	Mental QOL	Self-report	Variance for OBE=NS; variance for SBE=NS
	TS: EDNOS	10						
	TS: undiagnosed	12				Depression	Self-report	Variance for OBE=NS; variance for SBE=NS
[63]	TS: BN	21	100	27.0±9.9	21.5±2.9	Energy intake	Interview	Degree of LOC, r=.57 ***
						Vomiting	Interview	Positively associated with LOC (estimate=.67; SE=.15 ***) and energy intake (estimate=.00; SE=.00 ***)
						Hunger prior to eating	Interview	Positively associated with LOC (estimate=.14; SE=.05 **) but not energy intake
						Feeling compelled to start eating	Interview	Positively associated with LOC (estimate=.58; SE=.05 ***) but not energy intake
						Feeling compelled to continue eating	Interview	Positively associated with LOC (estimate=.67; SE=.04 ***) but not energy intake

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
						Feeling upset after eating	Interview	Positively associated with LOC (estimate=.56; SE=.04***) but not energy intake
						Feeling full after eating	Interview	Positively associated with LOC (estimate=.15; SE=.05***) and energy intake (estimate=.00; SE=.00***)
[29]	NTS: community-based with OBE	37		29.4±6.4	29.0±7.8	BMI	Self-report	OBE>SBE (t=2.25*)
						Eating-related psychopathology	Self-report	OBE=SBE (t=0.08)
						Physical QOL	Self-report	OBE=SBE (t=−1.00)
	NTS: community-based with SBE	52	100	28.6±6.5	25.7±5.2	Mental QOL	Self-report	OBE=SBE (t=0.02)
						Psychological distress	Self-report	OBE=SBE (t=−0.24)
						Severe mental health impairment	Self-report	OBE=SBE (χ^2=0.04)
[26]	TS: BED	101	100	45.7±11.0	37.9±7.1	BMI	NR	OBE=SBE
						Binge eating severity	Self-report	OBE=SBE
						Depression	Self-report	OBE=SBE
						Psychiatric distress	Self-report	OBE=SBE
						Interpersonal problems	Self-report	OBE=SBE
						Restraint	Self-report	OBE=SBE
						Hunger	Self-report	OBE=SBE
						Disinhibition	Self-report	OBE=SBE
[30]	NTS: community-based with OBE	154		26.2±7.0	27.4±7.2	BMI	Self-report	OBE>SBE [F(2,311)=6.7***]
						Driven exercise	Self-report	OBE=SBE=no-LOC (χ^2=4.29)
	NTS: community-based with SBE	68		25.6±7.8	24.1±5.8	Vomiting	Self-report	OBE=SBE=no-LOC (χ^2=0.10)
						Eating-related psychopathology	Self-report	OBE, SBE>no-LOC
	NTS: community-based with no LOC	108	100	25.4±7.6	25.4±5.4	Physical QOL	Self-report	OBE=SBE=no-LOC
						Mental QOL	Self-report	OBE=SBE=no-LOC
						Negative affect	Self-report	OBE>no-LOC; OBE=SBE; SBE=no-LOC [F(2,321)=8.0***]
[27]	TS: eating pathology with OBE	56	95.0	36.3±10.9	37.1±3.7	BMI	Measured	OBE=SBE

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	TS: eating pathology with SBE	14	93.0	39.5±11.7	37.8±4.5	Binge eating severity	Self-report	OBE=SBE
						Depression	Self-report	OBE=SBE
						Psychiatric comorbidity	Interview	OBE=SBE
[116]	TS: BN	174	100	28.4±7.1	22.8±4.4	BMI	NR	OBE+SBE, β=−0.07; OBE-SBE, β=0.08
						Weight concern	Interview	OBE+SBE, β=0.07; OBE-SBE, β=0.14
						Shape concern	Interview	OBE+SBE, β=0.18; OBE-SBE, β=0.05
						Restraint	Interview	OBE+SBE, β=−0.03; OBE-SBE, β=0.05
						Depression	Interview	OBE+SBE, β=0.29; OBE-SBE, β=0.02
						Self-esteem	Self-report	OBE+SBE, β=0.12; OBE-SBE, β=0.02
						Psychiatric distress	Self-report	OBE+SBE, β=0.19; OBE-SBE, β=−0.03
						Interpersonal problems	Self-report	OBE+SBE, β=0.16; OBE-SBE, β=0.03
						Social adjustment	Self-report	OBE+SBE, β=0.16; OBE-SBE, β=0.04
						Confidence to resist binge eating	Self-report	OBE+SBE, β=−0.18; OBE-SBE, β=−0.04
						Ability to resist binge eating	Self-report	OBE+SBE, β=−0.24**; OBE-SBE, β=0.20
[55]	TS: AN-binge/purge subtype	70	97.1	29.5±10.6	16.3±1.7	Eating-related psychopathology	Self-report	AN: OBE frequency, *r*=.21; SBE frequency, *r*=.12 BN: OBE frequency, *r*=.39**; SBE frequency, *r*=.18
	TS: BN	110	98.2	30.3±8.0	23.0±6.7	Emotional eating	Self-report	AN: OBE frequency, *r*=.12; SBE frequency, *r*=.75** BN: OBE frequency, *r*=.69**; SBE frequency, *r*=.02
[21]	TS: bariatric surgery with LOC	123			50.5±9.2	BMI	Measured	LOC=no-LOC (*t*=−1.50)
						Eating-related psychopathology	Self-report	LOC>no-LOC (*t*=−7.26***)
						Depression	Self-report	LOC>no-LOC (*t*=−5.42***)
	TS: bariatric surgery without LOC	103	79.0	43.8±10.9	48.9±7.0	Physical QOL	Self-report	LOC=no-LOC (*t*=1.53)
						Mental QOL	Self-report	LOC<no-LOC (*t*=3.63***)
						Night eating	Self-report	LOC>no-LOC (*t*=−5.51***)
						Alcohol use	Self-report	LOC=no-LOC (*t*=−1.10)
[22]	NTS: community-based, obese BED	53	62.3	F:42.6±11.5 M:42.8±9.7	F:39.7±5.9 M:35.2±3.9	BMI	Self-report	BED=subBED=OO=no pathology

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	NTS: community-based, obese subthreshold BED	119	66.4	F:43.2±11.8 M:47.9±13.2	F:38.6±5.9 M:37.2±6.5	Current shape	Self-report	BED=subBED=OO=no pathology
						Desired shape	Self-report	BED=subBED=OO=no pathology
						Current/ideal difference	Self-report	BED, subBED>OO, no pathology
						Weight dissatisfaction	Self-report	BED, subBED>OO, no pathology
	NTS: community-based, obese with OO	60	35.0	F:47.4±8.1 M:47.8±11.0	F:39.3±7.0 M:35.6±4.1	Weight importance	Self-report	BED>subBED>OO, no pathology
	NTS: community-based, obese with no pathology	160	50.0	F:44.1±10.4 M:50.8±10.5	F:37.9±5.4 M:35.0±4.3	Stress	Self-report	BED>OO, no pathology (F=3.18 *)
						Sadness	Self-report	BED>subBED>OO, no pathology (F=8.68 ***)
						Self-esteem	Self-report	BED<subBED, OO, no pathology; subBED<no pathology (F=7.68 ***)
[52]	NTS: college students with LOC	252	100	20.7±2.0	NR	Eating-related QOL	Self-report	OBE-only=SBE-only (OR=1.00)
	NTS: college students without LOC	297				Psychiatric comorbidity	Interview	OBE-only=SBE-only (OR=.61)
[31]	TS: BN	112			21.1±2.5	BMI	Measured	BN>BN with SBE
						Eating-related psychopathology	Interview	BN=BN with SBE
						Compensatory behaviors	Interview	BN=BN with SBE
						Psychiatric comorbidity	Interview	BN=BN with SBE
						Depression	Self-report	BN=BN with SBE
						Anxiety	Self-report	BN=BN with SBE
	TS: BN with SBE	28	98.0	25.0±9.0	23.5±3.4	Stress	Self-report	BN=BN with SBE
						QOL	Self-report	BN=BN with SBE
						Self-esteem	Self-report	BN=BN with SBE
						Perfectionism	Self-report	BN=BN with SBE
						Impulsivity	Self-report	BN=BN with SBE
						Interpersonal problems	Self-report	BN=BN with SBE
[23]	TS: bariatric surgery with LOC	221				BMI	Self-report	LOC=no-LOC(F=2.39)
						Depression	Self-report	LOC>no-LOC (F=35.82 ***)
			86.1	43.7±10.0	51.1±8.3	Mental QOL	Self-report	LOC<no-LOC (F=16.19 ***)
	TS: bariatric surgery without LOC	131				Physical QOL	Self-report	LOC<no-LOC (F=8.02 **)

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
						Eating-related psychopathology	Self-report	LOC>no-LOC (F=59.38***)
Youth								
[33]	NTS: school-based with BED	94	3.1		F:24.1±4.8 M:27.4±7.9	Obesity status	Measured	F: BED=subBED=OO=no pathology (χ^2=4.62) M: BED, sub-BED, OO>no pathology (χ^2=17.10***)
	NTS: school-based with subthreshold BED	243	7.9		F:24.3±4.9 M:25.8±6.1	Body satisfaction	Self-report	F: BED, subBED<OO<no pathology (F=66.94***) M: BED<OO, no pathology; BED=subBED; subBED=OO (F=17.75***)
	NTS: school-based with OO	255	6.3	Range=11–17	F:24.4±5.5 M:23.4±5.2	Depression	Self-report	F: BED, subBED>OO>no pathology (F=40.42***) M: BED, subBED, OO>no pathology (F=10.47***)
	NTS: school-based with no pathology	4142	1950		F:23.0±4.7 M:23.6±4.7	Self-esteem	Self-report	F: BED, subBED>OO>no pathology (F=62.01***) M: BED, subBED, OO>no pathology (F=27.99***)
						Suicidality	Self-report	F: BED, subBED, OO>no pathology (χ^2=111.72***) M: BED, subBED, OO>no pathology (χ^2=36.62***)
[34]	NTS: community-based with LOC	62	64.5	12.9 ± 2.8	1.4±1.0 (z-score)	BMI	Measured	LOC>no-LOC***
						Depression	Self-report	LOC>no-LOC (t=−4.91***)
	NTS: community-based without LOC	157	43.9	13.2 ± 2.8	0.8±1.1 (z-score)	Anxiety	Self-report	LOC>no-LOC (t=−6.14***)
						Interpersonal problems	Parent-report	LOC>no-LOC (t=−3.73***)
[58]	TS: BN with OBE	27	97.5	16.1±1.6	22.1±3.0	Compensatory behaviors	Interview	OBE=SBE [F(4,32)=1.79]
						Eating pathology	Interview	OBE=SBE [F(1,35)=0.72]
	TS: BN with SBE	10				Depression	Self-report	OBE<SBE [F(1,35)=6.14*]
						Self-esteem	Self-report	OBE=SBE [F(1,35)=0.02]
[49]	TS: BN	128	96.1	16.4±1.4	114.2±25.6 (%EBW)	(%EBW)	Measured	BN=PD-LOC=PD-noLOC>AN-B/P [F(3,241)=30.72***]
						Restraint	Interview	BN=PD-LOC=PD-noLOC=AN-B/P [F(3,233)=1.95]
	TS: AN-binge/purge	38	97.4	15.6±1.8	78.2±4.8 (%EBW)	Shape concern	Interview	BN=PD-LOC=PD-noLOC=AN-B/P [F(3,233)=2.19]
						Weight concern	Interview	BN=PD-LOC=PD-noLOC=AN-B/P [F(3,233)=1.95]
	TS: PD with LOC	23	87.0	15.3±1.9	105.8±15.0 (%EBW)	Eating concern	Interview	BN>PD-noLOC, AN-B/P; BN=PD-LOC; PD-noLOC=PD-LOC=AN-B/P [F(3,233)=7.53***]

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	TS: PD without LOC	56	91.1	16.2±1.4	106.3±13.5 (%IBW)	Depression Self-esteem	Self-report Self-report	BN=PD-LOC=PD-noLOC=AN-B/P [F(3,233)=0.77; p=.51] PD-LOC>BN, PD-noLOC, AN-B/P [F(3,209)=12.45 ***]
[46]	TS: overweight with BED	26	76.9	14.8±0.9	1.9±0.4 (z-score)	BMI z-score	Measured	BED=subBED=OO=no pathology
	TS: overweight with subthreshold BED	13	69.2	15.1±0.9	1.9±0.6 (z-score)	Weight/shape concerns	Self-report	BED, sub BED>OO, no pathology [F(3,95)=9.17 ***]
	TS: overweight with OO	18	50.0	15.4±1.1	1.8±0.6 (z-score)	Depression	Self-report	BED>OO, no-pathology; subBED=OO; subBED>no-pathology; OO=no-pathology [F(3,93)=7.39 ***]
	TS: overweight with no pathology	39	76.9	15.2±1.1	1.8±0.5 (z-score)			
[3]	NTS: school-based with OBE	222	63.5			Overweight status	Measured	F: OBE, OO>no pathology ** M: OBE, OO>no pathology **
						Risky weight control behavior	Self-report	F: OBE>OO>no pathology * M: OBE, OO>no pathology *
						Dieting	Self-report	F: OBE, OO>no pathology * M: OBE, OO>no pathology *
	NTS: school-based with OO	165	61.2			Body satisfaction	Self-report	F: OBE, OO<no pathology * M: OBE<OO<no pathology *
				12–17	NR	Cigarette use	Self-report	F: OBE=OO=no pathology M: OO<OBE, no pathology *
						Drug and alcohol use	Self-report	F: OBE=OO=no pathology M: OBE=OO=no pathology
	NTS: school-based with no pathology	2374	51.8			Self-injury	Self-report	F: OBE>no pathology; OO>no pathology; OBE=OO * M: OBE, OO>no pathology *
						Depression	Self-report	F: OBE>OO>no pathology * M: OBE>OO>no pathology *
						Self-esteem	Self-report	F: OBE<OO<no pathology * M: OBE, OO<no pathology *
[48]	TS: overweight with LOC	35	71.4	12.9±1.9	179.1±25.4 (adjusted)	BMI	NR	LOC=no-LOC [F(1,194)=3.45]
						Eating-related psychopathology	Interview	OBE>no-LOC; OBE=SBE; SBE=no-LOC [F(8,364)=3.08 **]
						External eating	Self-report	OBE>no-LOC; OBE=SBE; SBE=no-LOC [F(2,161)=4.36 *]

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	TS: overweight without LOC	161	59.0	12.7±1.7	169.9±26.8 (adjusted)	Restraint	Self-report	OBE=SBE=no-LOC [F(2,161)=1.23]
						Emotional eating	Self-report	OBE>SBE, no-LOC [F(2,161)=14.99 ***]
						Depression	Self-report	OBE>no-LOC; OBE=SBE; SBE=no-LOC [F(2,163)=8.82 ***]
[35]	NTS: school-based with LOC	108	69.4	13.8±0.9	19.0±3.2	BMI	Self-report	LOC>no-LOC (F=2.01)
						Restraint	Self-report	OBE, SBE>no-LOC (F=19.62 ***)
						Eating concern	Self-report	OBE, SBE>no-LOC (F=30.91 ***)
						Weight concern	Self-report	OBE, SBE>no-LOC (F=17.56 ***)
						Shape concern	Self-report	OBE, SBE>no-LOC (F=19.28 ***)
	NTS: school-based without LOC	538	55.8	13.9±0.9	18.6±2.5	Drive for thinness	Self-report	OBE, SBE>no-LOC (F=14.07 ***)
						Bulimia	Self-report	OBE, SBE>no-LOC (F=24.24 ***)
						Body dissatisfaction	Self-report	OBE>no-LOC; OBE=SBE; SBE=no-LOC (F=7.57 ***)
						Depression	Self-report	OBE>SBE>no-LOC (F=4.03 ***)
						Self-esteem	Self-report	OBE>no-LOC; OBE=SBE; SBE=no-LOC (F=6.34 **)
[57]	NTS: community-based with LOC	60				Eating-related psychopathology	Interview	LOC>no-LOC **
						Empathy	Self-report	LOC=no-LOC [F(1,59)=0.08]
						Risk-taking	Self-report	LOC=no-LOC [F(1,59)=1.40]
						Impulsivity	Self-report	LOC>no-LOC [F(1,59)=8.72 **]
						Novelty-seeking	Parent-report	LOC=no-LOC [F(1,59)=3.20]
	NTS: community-based without LOC	60	56.7	10.7±1.5	23.0±5.0	Harm avoidance	Parent-report	LOC=no-LOC [F(1,59)=1.74]
						Reward dependence	Parent-report	LOC=no-LOC [F(1,59)=1.12]
						Persistence	Parent-report	LOC=no-LOC [F(1,59)=2.59]
						Self-directedness	Parent-report	LOC<no-LOC [F(1,59)=5.92 *]
						Cooperativeness	Parent-report	LOC<no-LOC [F(1,59)=5.88 *]
						Self-transcendence	Parent-report	LOC=no-LOC [F(1,59)=0.22]

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
[56]	TS: overweight with LOC	4				Restraint	Interview	LOC=no-LOC
	TS: overweight without LOC	23	44.0	10.1±1.6	33.5±4.5	Eating concern	Interview	LOC>no-LOC ***
						Weight concern	Interview	LOC>no-LOC **
						Shape concern	Interview	LOC=no-LOC
[36]	NTS: community-based, obese with LOC	37	22.0	8.3±1.5	27.9±4.2	BMI	Measured	LOC>no-LOC (F=14.5 ***)
						Eating-related psychopathology	Self-report	LOC>no-LOC (F=7.8 **)
						Body dissatisfaction	Self-report	LOC>no-LOC (F=4.0 *)
	NTS: community-based, obese without LOC	75	38.0	8.7±1.4	24.6±4.2	Anxiety	Self-report	LOC>no-LOC (F=9.9 **)
						Depression	Self-report	LOC>no-LOC (F=10.0 **)
						Behavioral problems	Parent-report	LOC=no-LOC (F=0.7)
[37]	Mixed TS/NTS: overweight with OBE	70	90.0	15.2±1.5	27.7±6.5	BMI	Measured	LOC>no-LOC (t=2.05 *); OBE=SBE (t=0.54)
						Systolic blood pressure	Measured	LOC>no-LOC (F=10.36 **); OBE=SBE (F=1.27)
						Diastolic blood pressure	Measured	LOC=no-LOC (F=0.75); OBE=SBE (F=1.96)
	Mixed TS/NTS: overweight with SBE	80	98.0	14.5±1.7	28.2±4.2	Waist circumference	Measured	LOC=no-LOC (F=0.98); OBE=SBE (F=0.17)
						Triglycerides	Measured	LOC=no-LOC (F=0.03); OBE=SBE (F=1.60)
						HDL-cholesterol	Measured	LOC=no-LOC (F=2.76); OBE>SBE (F=4.03 *)
	Mixed TS/NTS: overweight with no LOC	179	82.0	14.8±1.5	26.2±7.9	LDL-cholesterol	Measured	LOC>no-LOC (F=9.90 **); OBE>SBE (F=6.30 **)
						Plasma glucose	Measured	LOC=no-LOC (F=0.14); OBE=SBE (F=0.83)
						Metabolic syndrome	Measured	LOC=no-LOC (χ^2=0.00); OBE=SBE (χ^2=1.85)
[45]	NTS: community-based with recurrent LOC	1643	84.0	14.9±2.7	22.1±3.6	BMI	Measured	Recurrent LOC>non-recurrent LOC>no-LOC [F(2,1587)=34.73 ***]
	NTS: community-based with non-recurrent LOC	156	80.1	14.8±2.6	21.1±3.7	Eating-related psychopathology	Self-report	Recurrent LOC>non-recurrent LOC>no-LOC [F(2,1640)=240.69 ***]
	NTS: community-based with no LOC	226	56.5	15.1±2.8	20.0±3.1	Eating-related QOL	Self-report	Recurrent LOC>non-recurrent LOC>no-LOC [F(2,1640)=264.59 ***]

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
[38]	NTS: community-based with OBE	46	60.9	12.6±.4	1.4±.2 (z-score)	BMI z-score	Measured	OBE, SBE>OO, no pathology (F=5.04 **)
	NTS: community-based with SBE	42	61.9	13.4±.4	1.4±.2 (z-score)	Eating-related psychopathology	Interview	OBE, SBE>OO, no pathology (F=21.79 ***)
	NTS: community-based with OO	68	50.0	13.0±.4	1.0±.1 (z-score)	Depression	Self-report	OBE, SBE>OO, no pathology (F=5.83 **)
	NTS: community-based with no pathology	211	41.7	12.5±.2	.8±.1 (z-score)	Anxiety	Self-report	OBE, SBE>OO, no pathology (F=7.13 ***)
[39]	Mixed: TS overweight and NTS community-based with OBE	106	60.2	13.1±2.6	Range of means= 1.3±1.2 to 2.4±0.3 (z-score)	BMI z-score	Measured	OBE, SBE>no pathology; OBE>OO SBE=OO [F(3,427)=4.8 **]
						Meal type of episode	Interview	OBE, SBE>OO, normal episode for snack vs. meal [χ^2(N=442)=40.3 **]
						Overeaten/eaten forbidden food before eating episode	Interview	OBE, SBE>OO, normal episode [χ^2(N=444)=27.4 **]
						Negative emotion before episode	Interview	OBE, SBE>OO, normal episode [χ^2(N=445)=38.6 **]
	Mixed: TS overweight and NTS community-based with SBE	67				Restricting before episode	Interview	OBE=SBE=OO=normal episode [χ^2(N=445)=2.6]
						Emotional before episode	Interview	OBE=SBE=OO=normal episode [χ^2(N=445)=6.6]
						Hungry before episode	Interview	OBE=SBE=OO=normal episode [χ^2(N=445)=6.3]
						Eating despite lack of hunger before episode	Interview	OBE, SBE>OO, normal episode [χ^2(N=440)=70.0 **]
						Tired before episode	Interview	OBE, SBE, OO>normal episode [χ^2(N=445)=8.2 *]
	Mixed: TS overweight and NTS community-based with OO	106				With whom during episode	Interview	OBE, SBE>OO, normal episode for eating alone [χ^2(N=441)=20.8 **]
						Time of day during episode	Interview	[χ^2(N=443)=15.4]
						Celebration during episode	Interview	[χ^2(N=443)=4.0]
						Secretive during episode	Interview	OBE, SBE>OO, normal episode [χ^2(N=444)=38.6 **]
						Numbing out during episode	Interview	OBE, SBE>OO, normal episode [χ^2(N=445)=46.7 **]
	Mixed: TS overweight and NTS community-based with no pathology	166				Hiding food during episode	Interview	OBE>SBE, OO, normal episode [χ^2(N=442)=18.4 **]
						Eating quickly during episode	Interview	OBE>SBE, OO, normal episode [χ^2(N=444)=43.1 **]
						Eating more than others during episode	Interview	OBE>SBE, OO, normal episode [χ^2(N=441)=57.8 **]
						Location during episode	Interview	SBE>OBE, OO, normal episode for watching television [χ^2(N=439)=32.5 **]

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
						Negative emotion after eating	Interview	OBE, SBE>OO, normal episode [$\chi^2(N=445)=53.5^{**}$]
						Guilt/shame after eating	Interview	OBE, SBE>OO, normal episode [$\chi^2(N=445)=46.2^{**}$]
						Full after eating	Interview	OBE=SBE=OO=normal episode [$\chi^2(N=445)=5.2$]
						Sick after eating	Interview	OBE>SBE, OO, normal episode [$\chi^2(N=445)=11.6^{**}$]
[41]	NTS: community-based with LOC	18	44.4	13.1±2.7	1.6±0.9 (z-score)	BMI z-score	Measured	LOC>no-LOC *
						Eating in response to depression	Self-report	LOC>no-LOC ($F=13.2^{***}$)
	NTS: community-based without LOC	137	54.0	14.4±2.3	1.0±1.1 (z-score)	Eating in response to anger/ anxiety/frustration	Self-report	LOC>no-LOC ($F=5.4^{*}$)
						Eating in response to feeling unsettled	Self-report	LOC>no-LOC ($F=12.4^{**}$)
[44]	NTS: community-based with LOC	15			28.2±8.1	BMI	Measured	OBE+SBE>OO, no pathology [$F(2,158)=3.6^{*}$]
						Eating-related psychopathology	Interview	OBE+SBE>OO, no pathology [$F(2,158)=7.8^{**}$]
	NTS: community-based with OO	33	86.7	10.0±1.8	23.8±8.6	Depression	Self-report	OBE+SBE=OO=no pathology [$F(2,150)=0.19$]
						Anxiety	Self-report	OBE+SBE=OO=no pathology [$F(2,149)=0.24$]
	NTS: community-based with no pathology	114			21.9±8.0	Behavioral problems	Parent-report	OBE+SBE=OO=no pathology [$F(2,148)=1.2$]
[42]	Mixed TS/NTS: community-based with LOC	81	63.0	12.0±2.7	2.0±0.8 (z-score)	BMI z-score	Measured	LOC>no-LOC *
						Energy intake	Interview	LOC=no-LOC
						% energy from carbohydrate	Interview	LOC>no-LOC *; OBE=SBE
	Mixed TS/NTS: community-based without LOC	168	51.0	12.2±2.6	1.6±1.1 (z-score)	% energy from protein	Interview	LOC<no-LOC **; OBE, SBE<OO, no pathology
						% energy from fat	Interview	LOC=no-LOC; OBE=SBE
[43]	TS: diabetic with BED	42	69.0	14.0	2.4±0.4 (z-score)	BMI z-score	Measured	BED>OO>no pathology **
	TS: diabetic with subthreshold BED	135	67.4		2.3±0.5	Eating-related psychopathology	Self-report	BED>OO, no pathology **
	TS: diabetic with OO	164	62.2		2.2±0.5	Depression	Self-report	BED>OO, no pathology **
	TS: diabetic with no pathology	337	65.3		2.2±0.5	QOL	Self-report	BED>OO>no pathology **
Ecological momentary assessment								

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	Method	
Adults								
[59,65,117]	NTS: community-based obese with BED	5				Pre-episode negative affect	Self-report	Increased prior to OBE * but not SBE or OO[65] OBE and OO more likely on days characterized by high or increasing negative affect Likelihood of SBE did not differ by affect trajectory[117] OBE>SBE, OO, normal episode; SBE>normal episode; SBE=OO; OO=normal episode (Wald χ^2=15.67 **)[59]
						Post-episode negative affect	Self-report	Decreased after OBE * but not SBE or OO[65] OBE>SBE, OO, normal episode; SBE>normal episode; SBE=OO; OO=normal episode (Wald χ^2=24.39 ***)[59]
						Pre-episode hunger	Self-report	OBE<SBE, normal episode; OBE=OO; SBE=OO, normal episode (Wald χ^2=18.14 ***)[59]
						Post-episode hunger	Self-report	OBE, OO<SBE, normal episode (Wald χ^2=39.75 ***)[59]
	NTS: community-based obese without BED	45	84.0	43.0±11.9	40.3±8.5	Pre-episode cravings	Self-report	OBE=SBE=OO=normal episode (Wald χ^2=8.14)[59]
						Post-episode cravings	Self-report	OBE<SBE; OBE>OO; OBE=normal episode; SBE>OO; SBE=normal episode; OO<normal episode (Wald χ^2=25.87 ***)[59]
						Location	Self-report	OBE=SBE=OO=normal episode (Wald χ^2=1.22)[59]
						Eating alone	Self-report	SBE>OBE, OO; SBE=normal eating; normal eating=OBE, OO (Wald χ^2=13.2 **)[59]
						Eating while watching television	Self-report	OBE=SBE=OO=normal episode (Wald χ^2=0.92)[59]
						Pre-episode eating because others are eating	Self-report	OBE=SBE=OO=normal episode (Wald χ^2=2.07)[59] OBE=SBE=OO=normal episode
						Post-episode eating because others are eating	Self-report	OBE=SBE=OO=normal episode (Wald χ^2=5.37)[59]
						Pre-episode alcohol ingestion	Self-report	OBE=SBE=OO=normal episode (Wald χ^2=10.55)[59]
						Post-episode stressful event	Self-report	OBE=SBE=OO=normal episode (Wald χ^2=2.81)[59]
[61,62]	NTS: community-based obese with BED	9	86.4	35.7±11.9	38.9±8.7	Pre-episode negative affect	Self-report	Positively associated with LOC [t(1,427)=4.61 ***][61] Not associated with energy intake [t(1,427)=0.82][61]
						Post-episode negative affect	Self-report	No main effect for LOC [t(1,427)=1.68][61]

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
								No main effect for energy intake [$t(1,427)=-1.46$][61] Positively associated with energy intake in non-BED [$t(1,427)=-2.86^{**}$] but not BED[61] Positively associated with LOC in BED, irrespective of energy intake, and negatively associated with LOC and energy intake in non-BED [$t(1,427)=-2.28^{*}$][61]
	NTS: community-based without BED	13				Post-meal LOC while eating	Self-report	Positively associated with BED status (OR=3.60; SE=0.29***), energy intake (OR=1.00; SE=0.00***), and negative affect (OR=1.16; SE=0.04***)
[60]	NTS: AN	118	100	25.3±8.4	17.2±1.0	Negative affect	Self-report	OBE,SBE>avoidant eating, restrictive eating>solitary eating (Wald $\chi^2=88.47^{***}$)
						Compensatory behaviors	Self-report	OBE>SBE avoidant eating, restrictive eating; SBE>solitary eating (Wald $\chi^2=87.45^{***}$)
						Body checking	Self-report	Solitary eating>OBE, avoidant eating>restrictive eating; SBE=binge eating (Wald $\chi^2=29.00^{***}$)
						Self-weighing	Self-report	OBE=SBE=avoidant eating=restrictive eating=solitary eating (Wald $\chi^2=4.17$)
						Stress	Self-report	Restrictive eating>OBE, SBE (Wald $\chi^2=65.86^{***}$)
Youth								
[67]	NTS: community-based with LOC	59				Energy intake	Interview	LOC>no-LOC across meal types [$F(1,106)=4.39^{*}$]; binge meal in LOC>normal meal in no-LOC [$F(1,157)=4.41^{*}$]
						Carbohydrate	Interview	Binge meal>normal meal in LOC [$F(1,366)=6.99^{**}$]; binge meal in LOC>normal meal in no-LOC [$F(1,150)=9.65^{**}$]
			55.9	10.8±1.5	23.0±5.1	Fat	Interview	LOC=no-LOC across meal types; binge meal=normal meal across groups
						Protein	Interview	LOC=no-LOC across meal types; binge meal=normal meal across groups
						Happy	Interview	Binge meals, regular meals<random signal in LOC [$F(2,875)=24.98^{***}$]; LOC=no-LOC across meal types; binge meal=normal meal across groups
						Sad	Interview	Binge days in LOC>non-binge days in no-LOC [$F(1,71)=6.29^{**}$]; LOC=no-LOC across meal types; binge meal=normal meal across groups

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	NTS: community-based without LOC	59				Afraid	Interview	LOC=no-LOC across meal types; binge meal=normal meal across groups
						Upset	Interview	LOC=no-LOC across meal types; binge meal=normal meal across groups
						Food/eating-related cognitions	Interview	LOC>no-LOC across meal types [$F(1,110)=16.62^{***}$]; binge meal, normal meal>random signal in LOC [$F(2,892)=43.32^{***}$]; binge meal in LOC>normal meal in no-LOC [$F(1,113)=16.55^{***}$]
						Body-related cognitions	Interview	LOC>no-LOC across meal types [$F(1,116)=10.14^{**}$]; binge meal, normal meal>random signal in LOC [$F(2,872)=9.22^{***}$]; binge meal in LOC>normal meal in no-LOC [$F(1,96)=52.73^{***}$]
						Hunger	Interview	LOC=no-LOC across meal types; binge meal=normal meal across groups
						Satiety	Interview	LOC=no-LOC across meal types; binge meal=normal meal across groups
[68]	NTS: community-based overweight with LOC	30	100	14.9±1.5	36.1±7.5	Interpersonal problems	Self-report	Predictive of LOC eating at between (estimate=0.31; SE=0.14*) and within-subjects level (estimate=0.14; SE=0.07*)
						Negative affect	Self-report	Not predictive of LOC eating at between- (estimate=1.21; SE=0.76) or within-subjects level (estimate=0.33; SE=0.34)
[69]	NTS: community-based overweight with LOC	17	100	14.8±1.6	2.2±0.5 (z-score)	Heartrate	Measured	Positively associated with LOC at within- (estimate=0.02; SE=0.00***), but not between-subjects level
						Heartrate variability	Measured	Negatively associated with LOC at within- (estimate=−0.01; SE=0.00***), but not between-subjects level
Feeding laboratory								
Adults								
[71]	NTS: more obese with BED	12	100	31.7±1.3	41.5±0.9	Energy intake	Measured	BED: Binge meal>normal meal [$t(1,37)=2.45^{*}$] Non-BED: binge meal=normal mean
	NTS: more obese without BED	6		35.0±2.8	40.4±0.5	% energy from protein	Measured	Binge meal=normal meal across groups
	NTS: less obese with BED	9		33.7±2.2	31.1±0.5	% energy from carbohydrate	Measured	Binge meal=normal meal across groups

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	NTS: less obese without BED	8		32.5±1.8	30.4±0.5	% energy from fat	Measured	Binge meal=normal meal across groups
	NTS: normal-weight with no pathology	7		31.1±3.4	21.0±0.7	Satiety	Self-report	BED: Binge meal>normal meal [$t(1,37)=2.45^{*}$] Non-BED: binge meal=normal meal for obese
[72]	TS: BN	11		24.2±2.2	−1.5±12.4 (%deviation from EBW)	Energy intake	Measured	Binge meal>normal meal across groups [$F(1,19)=27.20^{***}$]
	NTS: No pathology	10	100	23.9±4.3	0.8±10.3 (%deviation from EBW)	Rate of energy intake	Measured	Binge meal>normal meal across groups [$F(1,19)=13.23^{**}$]
[73]	TS: BN	8	100	23.0±3.5	95.1±12.1 (%EBW)	Energy intake	Measured	Mean binge meal>Mean normal meal for multi-course and single item meals (no statistical tests reported)
[74]	TS: BN	8		24.6±5.0	19.5±1.8	Energy intake	Measured	BN: binge meal>normal meal [$t(14)=4.24^{***}$] College students: Binge meal=normal meal
						Rate of eating	Measured	BN: binge meal>normal meal for multi-item [$t(14)=3.63^{*}$] but not single-item meal [$t(14)=1.26$] College students: binge meal=normal meal
	NTS: college students	8	100	25.3±8.0	20.2±1.2	Pre-episode satiety	Self-report	Binge meal=normal meal across groups [$F(1,14)=0.71$]
						Post-episode satiety	Self-report	Binge meal=normal meal across groups [$F(1,14)=2.82$]
						Control over eating	Self-report	Binge meal<normal mea across groupsl [$F(1,14)=9.38^{**}$]
[64]	NTS: community-based with BED	30		43.8±8.7	34.6±6.1	Energy intake	Measured	Degree of control, $r=-.56^{**}$
	NTS: community-based without BED	30	100	44.7±10.4	32.2±6.3	Depressed mood	Self-report	Self-labeled OBE>self-labeled OO ($t=2.51^{*}$) Degree of control, $r=-.26^{*}$
						Anxious mood	Self-report	Self-labeled OBE=self-labeled OO ($t=1.95$) Degree of control, $r=-.21^{*}$

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
[75]	TS: BN	12	100	24.1±2.9	1.6±11.9 (%deviation from EBW)	Energy intake	Measured	Multi-item meal: binge meal>multi-item normal meal *; degree of contol, *r*=.58 ** for normal meal and *r*=.61 ** for binge meal in BN; degree of control, *r*=NS for normal meal and binge meal in no pathology group Single-item meal: degree of contol, *r*=.17 for normal meal and *r*=.63 ** for binge meal in BN; degree of control, *r*=.02 for normal meal and *r*=.00 binge meal in no pathology group
	NTS: no pathology	10		23.9±4.3	0.8±10.3 (%deviation from EBW)	% energy from carbohydrate	Measured	Multi-item binge meal=multi-item normal meal across groups
						% energy from protein	Measured	Multi-item binge meal<multi-item normal meal across groups *
						% energy from fat	Measured	Multi-item binge meal=multi-item normal meal across groups
[76]	NTS: obese with BED	10	100	36.2±2.6	40.1±3.4	Energy intake	Measured	Binge meal>normal meal in BED * but not non-BED
						% energy from protein	Measured	Binge meal=normal meal across groups
	NTS: obese without BED	9		39.0±2.9	38.8±1.4	% energy from carbohydrate	Measured	Binge meal=normal meal across groups
						% energy from fat	Measured	Binge meal=normal meal across groups
						LOC while eating	Self-report	Binge meal=normal meal across groups
Youth								
[77]	NTS: community-based with LOC	60	56.7	10.8±1.5	23.0±5.0	Energy intake	Measured	Parent-child test meal: LOC=no-LOC Child-only snack: LOC>no-LOC *
						Total protein	Measured	Parent-child test meal: LOC=no LOC Child-only snack: LOC>no-LOC *
						Total carbohydrate	Measured	Parent-child test meal: LOC=no LOC Child-only snack: LOC=no LOC
	NTS: community-based without LOC	60				Total fat	Measured	Parent-child test meal: LOC=no LOC Child-only snack: LOC>no-LOC *
						LOC while eating	Self-report	Parent-child test meal: LOC=no-LOC Child-only snack: LOC>no-LOC *
[47]	NTS: overweight with LOC	22	100	10.6±1.8	2.3±0.4 (z-score)	BMI z-score	Measured	LOC=no-LOC
						Energy intake	Measured	LOC=no-LOC

Study	Sample	*n*	%F	Age	BMI	Measurement		Convergence with anthropometric, psychosocial, and behavioral measures
						Domain	**Method**	
	NTS: overweight without LOC	22		10.3±2.0	2.1±0.4 (z-score)	LOC while eating	Self-report	Predicted by negative affect prior to mood induction in LOC group [α^2 (N=22)=7.08 *]
[66]	NTS:community-based with LOC	110	100	14.5±1.7	1.5±0.3 (z-score)	Pre-episode negative affect	Measured	Energy intake, β=NS
						Post-episode negative affect	Measured	Energy intake, β=NS
[40]	NTS: community-based with LOC	50	64.0	13.3±2.7	27.7±9.9	BMI	Measured	LOC>no-LOC **
						Energy intake	Measured	Binge meal>normal meal across groups (estimate= −0.04; SE=0.02 **); LOC=no-LOC (estimate=0.00; SE=0.03)
						% energy from protein	Measured	LOC<no-LOC across binge and normal meals **
						% energy from carbohydrate	Measured	LOC>no-LOC across binge and normal meals *
						% energy from fat	Measured	Binge meal=normal meal; LOC=no-LOC
						Post-episode anxiety	Self-report	Binge meal=normal meal; positively associated with LOC status *
	NTS: community-based without LOC	127	41.7	13.6±2.8	23.4±7.3	Post-episode anger	Self-report	Binge meal=normal meal across groups
						Post-episode confusion	Self-report	Binge meal=normal meal; positively associated with LOC status *
						Post-episode depression	Self-report	Binge meal=normal meal across groups
						Post-episode fatigue	Self-report	Binge meal=normal meal across groups
						Post-episode tension	Self-report	Binge meal=normal meal across groups
						Post-episode vigor	Self-report	Binge meal=normal meal across groups

Note: Studies using identical samples are grouped together for ease of reading. Age and BMI reported as means unless otherwise stated. Only comparisons involving binge eating constructs are reported.

Abbreviations: F=female; BMI=body mass index (kg/m^2); NTS=non-treatment-seeking; BED=binge eating disorder; OBE=objective binge eating; SBE=subjective binge eating; TS=treatment-seeking; LOC=loss of control; QOL=quality of life; AN=anorexia nervosa; BN=bulimia nervosa; EDNOS=eating disorder not otherwise specified; NR=not reported; PD=purging disorder; OO=objective overeating; NS=not significant; SE=standard error; M=male

* $p \leq .05$

** $p < .01$

*** $p < .001$

Table 4

Summary of studies assessing the predictive validity of binge eating constructs

Study	Sample	*n*	%F	Age	BMI	Predictor	Length of F/U[¥]	Outcome measure	Method
Adults									
81	TS: BN	85	96.5	29.5±9.1	22.8±5.8	Baseline SBE frequency	3y	Remission from BN: OR=0.87[*]	Interview
	TS: BED	133	88.0	43.9±11.9	38.0±7.3			Remission from BED: OR=0.90[*]	
18	TS: underweight eating disorders with OBE	33		27.9±6.9	15.4±1.6	Baseline LOC status		Increase in BMI: OBE, SBE<no-LOC [$F(1,2,68)=5.30^{**}$]	Measured
								Decrease in eating-related psychopathology: OBE=SBE=no-LOC [$F(1,2,68)=2.24$]	Interview
								Decrease in depression: OBE=SBE=no-LOC [$F(1,2,68)=2.97$]	Self-report
								Decrease in anxiety: OBE=SBE=no-LOC [$F(1,2,68)=1.82$]	Self-report
	TS: underweight eating disorders with SBE	36		25.8±10.5	14.0±1.3			Decrease in novelty seeking: OBE=SBE=no-LOC [$F(1,2,68)=0.80$]	Self-report
			100				5m	Decrease in harm avoidance: OBE=SBE=no-LOC [$F(1,2,68)=0.60$]	Self-report
								Decrease in reward dependence: OBE=SBE=no-LOC [$F(1,2,68)=0.21$]	Self-report
								Decrease in persistence: OBE=SBE=no-LOC [$F(1,2,68)=0.70$]	Self-report
	TS: underweight eating disorders with no LOC	36		24.3±9.0	14.4±1.7			Decrease in self-directedness: OBE=SBE=no-LOC [$F(1,2,68)=0.75$]	Self-report
								Decrease in cooperativeness: OBE=SBE=no-LOC [$F(1,2,68)=0.28$]	Self-report
								Decrease in self-transecendence: OBE=SBE=no-LOC [$F(1,2,68)=0.16$]	Self-report
78	TS: bariatric surgery	129	80.0	45.2±11.5	44.3±6.8	Pre-surgical LOC status	12m	% weight loss: LOC=no-LOC	Measured
79	TS: bariatric surgery	183	83.1	46.0 (median)	45.1	Pre-surgical monthly OBE		Weight change: β=−0.7	Measured
						Pre-surgical monthly SBE	3y	Weight change: β=1.8	
						Pre-surgical monthly OO		Weight change: β=−1.6	
83	TS: BN	80	90	27.3±9.6	23.9±5.5	Baseline to end-of-treatment change in OBE frequency		Decrease in eating-related psychopathology: B=0.00; SE=0.01	Interview
								Decrease in depression: B=0.03; SE=0.07	Self-report
							4m	Decrease in anxiety: B=0.12; SE=0.08	Self-report
								Increase in self-esteem: B=−0.00; SE=0.01	Self-report
						Baseline to end-of-treatment change in SBE frequency		Decrease in eating-related psychopathology: B=0.03; SE=0.01[**]	Interview

Study	Sample	*n*	%F	Age	BMI	Predictor	Length of F/U[¥]	Outcome measure	Method
								Decrease in depression: *B*=0.24; SE=0.08 **	Self-report
								Decrease in anxiety: *B*=0.37; SE=0.09 ***	Self-report
								Increase in self-esteem: *B*=−0.02; SE=0.01	Self-report
80	TS: BED placeb-responders	147				Baseline OBE days		Placebo responders<non-responders [$t(446)=2.83$ **]	Interview
			90.3	41.8±9.6	35.3±5.3	Baseline SBE days	4w	Placebo responders>non-responders [$t(446)=2.70$ **]	Interview
	TS: BED non-placebo-responders	304				Baseline OO days		Placebo responders=non-responders [$t(447)=0.05$]	Interview
30	NTS: community-based with OBE	154		26.2±7.0	27.4±7.2			Increase in BMI: OBE=no-LOC (coefficient=−0.90; SE=0.68); OBE>SBE (coefficient=−2.51; SE=0.79 *)	Self-report
	NTS: community-based with SBE	68		25.6±7.8	24.1±5.8			Increase in eating-related psychopathology: OBE>no-LOC (coefficient=−0.42; SE=0.12 *); OBE=SBE (coefficient=−0.17; SE=0.13)	Self-report
			100			Baseline LOC status	5y	Decrease in physical QOL: OBE=no-LOC (coefficient=0.22; SE=0.84); OBE=SBE (coefficient=0.23; SE=0.98)	Self-report
	NTS: community-based with no LOC	108		25.4±7.6	25.4±5.4			Decrease in mental QOL: OBE<no-LOC (coefficient=2.16; SE=1.08 *); OBE=SBE (coefficient=−0.33; SE=1.25)	Self-report
								Decrease in negative affect: OBE=no-LOC (coefficient=−1.42; SE=0.77); OBE=SBE (coefficient=1.27; SE=0.89)	Self-report
82	TS: BED	50	100	42.4±10.1	34.2±7.1	Baseline OBE frequency	8w	Binge eating remission: *B*=0.43 *	Self-report
						Baseline SBE frequency		Binge eating remission: NS	
23	TS: bariatric surgery	361	86.1	43.7±10.0	51.1±8.3	Baseline LOC status		% weight loss at all available F/U: $F(1,381)=0.03$	Self-report
						6m LOC status	2y	% weight loss at 12m and 24m: $F(1,252)=4.75$ *	
						12m LOC status		% weight loss at 24m: $F(1,130)=8.79$ **	
Youth									
118	TS: obesity	132	62.1	13.6±2.2	2.2±0.3 (z-score)	Baseline OBE status		Change in BMI: $t=1.11$	Measured
							10m	Attrition: Wald $\chi^2=1.55$	Measured
						Baseline SBE status		Change in BMI: *B*=0.27	Measured
								Attrition: Wald $\chi^2=3.96$ *	Measured

Study	Sample	*n*	%F	Age	BMI	Predictor	Length of F/U[¥]	Outcome measure	
								Domain	Method
[84]	NTS: community-based with LOC	60	58.3	10.8±1.5	23.0±5.0	Baseline LOC status	5.5y	BMI at F/U: $t(59)=-1.06$	Measured
								Eating-related psychopathology at F/U: $t(59)=-1.22$	Self-report
	NTS: community-based without LOC	60	55.0					Onset of BED: OR=1.39	Interview
								Depression at F/U: $t(59)=-0.10$	Self-report
[85]	NTS: community-based with LOC	55	59.8	10.7±1.5	24.0±5.5	Baseline LOC status	2.2y	Change in BMI: LOC=no-LOC	Measured
								Onset of BED: LOC>no-LOC [$t(46)=2.71$**]	Interview
	NTS: community-based with LOC	57						Change in eating-related psychopathology: LOC=no-LOC [$t(46)=1.78$]	Interview
								Change in depression: LOC=no-LOC [$t(46)=0.27$]	Self-report
[56]	TS: overweight with LOC	4	44.0	10.1±1.6	33.5±4.5	Baseline LOC status	4m	Change in BMI: LOC=no-LOC	Measured
	TS: overweight without LOC	23						Attrition: LOC=no-LOC	Measured
[4]	NTS: community-based with OBE	16882	53.5	12.0±1.6	NR	OBE vs. no overeating status	9y	Onset of overweight: OR=1.73*	Self-report
								Onset of high depression symptoms: OR=2.19*	
	NTS: community-based with OO							Onset of binge drinking: OR=1.14	Self-report
								Onset of marijuana use: OR=1.85*	
								Onset of other drug use: OR=1.59*	Self-report
						OO vs. no overeating status		Onset of overweight: OR=1.24	
	NTS: community-based with no pathology							Onset of high depression symptoms: OR=1.58	Self-report
								Onset of binge drinking: OR=1.01	
								Onset of marijuana use: OR=2.67*	Self-report
								Onset of other drug use: OR=1.89*	
[86]	TS: bariatric surgery	101	72.3	15.8±1.1	47.2±0.9	Baseline LOC status	15m	Change in BMI: intercept=0.29; SE=0.14*; slope=0.48; SE=0.08*	Measured
[88]	NTS: community-based with LOC	46	73.9	10.3±.01	25.4±1.1	Baseline LOC status	4.7y	Onset of BED: LOC>no-LOC (OR=10.8*)	Interview
								Increase in eating-related psychopathology: LOC>noLOC*	Interview
	NTS: community-based without LOC	149	52.3	10.2±0.0	21.8±0.3			Increase in depression: LOC=no-LOC	Self-report
								Increase in anxiety: LOC>noLOC*	Self-report

Study	Sample	*n*	%F	Age	BMI	Predictor	Outcome measure		
							Length of F/U[¥]	Domain	Method
[87]	NTS: community-based aged 6–8y	29	13.3	8.3±0.6	20.6±5.9				
	NTS: community-based aged 9–10y	64	24.4	10.1±0.6	23.1±7.6	Baseline LOC status	4.5y	Change in BMI: LOC>no-LOC (estimate=0.61; SE=0.26 **)	Measured
	NTS: community-based aged 11–12y	50	19.6	11.9±0.5	24.8±6.9				

Note: Age and BMI reported as means unless otherwise stated. Only comparisons involving binge eating constructs are reported.

Abbreviations: F=female; BMI=body mass index (kg/m^2); F/U=follow-up; TS=treatment-seeking; BN=bulimia nervosa; BED=binge eating disorder; SBE=subjective binge eating; OR=odds ratio; LOC=loss of control; OBE=objective binge eating; OO=objective overeating; SE=standard error; NTS=non-treatment-seeking;

¥ y=years; m=months; w=weeks

* $p \leq .05$

** $p < .01$

*** $p < .001$