Binge Eating Assessment

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Abstract

This chapter provides an overview of binge eating assessments that are commonly used for diagnosis, case conceptualization, treatment planning, ongoing assessment, and treatment outcome. Included is a review of well-validated clinical interviews, self-report measures, and laboratory eating paradigms that are available for the assessment of binge-eating disorder (BED) in clinical and research contexts. Assessments with adequate psychometric properties are described, and benefits, limitations, and criteria assessed to aid in the selection of an appropriate measure for each context and question. This chapter describes disorders characterized by binge eating based on DSM-5 criteria and relevant updates from ICD-11. A review of clinical interviews including the Eating Disorder Examination (EDE), Eating Disorder Assessment for DSM-5 (EDA-5), and the Structured Clinical Interview for DSM-5 (SCID-5) are provided along with evaluations of self-report measures including the Eating Disorder Examination-Questionnaire (EDE-Q), the Eating Disorder Diagnostic Scale (EDDS), the Eating Pathology Symptoms Inventory (EPSI), Questionnaire on Eating and Weight Patterns (QWEP), and self-monitoring completed within the context of cognitive-behavioral therapy. Finally, laboratory eating paradigms are discussed as a useful and objective real-time assessment of eating behavior. In sum, this chapter provides information that may assist clinicians and researchers in understanding and selecting appropriate measures to evaluate binge eating.

Keywords

Binge-eating disorder · Bulimia nervosa · Eating disorders · Feeding disorders · Assessment, diagnosis, and classification · DSM-5

Learning Objectives

Readers will be able to:

1. Identify and select an assessment of binge eating that is a best fit in clinical and research contexts.
2. Distinguish assessment tools based on their characteristics, limitations, and benefits.

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1 Introduction

Binge eating episodes, as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA 2013), are characterized by consuming a large amount of food in a discrete period of time (given the context) and experiencing a sense of loss of control, or not being able to resist or stop eating once started. Binge eating is a behavior required for two of the eating disorders (bulimia nervosa, BN, and binge-eating disorder, BED) and can be observed in a third (individuals with the binge eating/purging subtype of anorexia nervosa, AN) as well as in residual categories of Other Specified Feeding or Eating Disorder and some presentations of Unspecified Feeding or Eating Disorder. To be diagnosed with BED in DSM-5, binge eating also must be accompanied by marked distress about the episode, and three of five additional indicators: eating more rapidly than usual, eating until uncomfortably full, eating large amounts of food when not physically hungry, eating alone because of embarrassment about what or how much one is eating, and feeling disgusted, depressed, or guilty after eating. In the 11th edition of the *International Classification of Diseases*, binge eating will have an even broader definition, in which loss of control is the only required element, and size of the eating episode will be irrelevant in the diagnosis of eating disorders.

There are numerous assessments used to measure binge eating, including clinical interviews, self-report measures, and laboratory eating paradigms. For example, a systematic review by Burton et al. (2016) of self-report measures identified 29 that assess binge eating symptoms. However, the two measures with the strongest psychometric data (Bulimic Investigatory Test–Edinburgh, BITE, Ricca et al. 2000; Bulimia Test–Revised, BULIT-R, Thelen et al. 1991) assess related symptoms of BN and BED, rather than the frequency of binge eating to allow for a diagnosis of disorders characterized by binge eating. In this chapter, we review the assessment measures with adequate psychometrics and report psychometric ratings and criteria assessed by each measure.

2 Clinical Interviews

2.1 Eating Disorder Examination (EDE)

The Eating Disorder Examination (EDE, current version 17.0D; Fairburn et al. 2014), is widely viewed as the gold standard assessment of eating disorders (Wilson et al. 1993; Berg et al. 2012). The EDE is a semi-structured, investigator-based interview, which takes 45–75 min to administer. The EDE provides frequency data on key features of eating disorders, such as number of episodes and, in some cases, number of days on which the behavior occurred; and it also assesses severity. This measure assigns DSM-5 eating disorder diagnoses and it is publically available at http://www.cred-oxford.com/pdfs/EDE_17.0D.pdf.

The EDE assesses a broad range of psychopathology commonly associated with AN, BN, and BED and has been adapted to allow for the diagnosis of eating disorders based on the DSM-5 criteria. It includes four subscales (Restraint, Eating Concern, Shape Concern, and Weight Concern) as well as a global score. This measure was created primarily as a research tool for assessing the severity of symptoms, which has led to frequent usage in studies of treatment response, and captures behaviors during the past 28 days and up to 3 months for diagnostic items related to BED.

Assessors using the EDE rate the amounts of food included in eating episodes and accompanying feelings of loss of control to categorize four different types of eating. This categorization is critical for diagnosing BN and BED. The EDE assesses four different types of eating viewed by the individual as excessive:

(a) objective bulimic episodes (OBEs), defined as the consumption of an objectively large amount of food while experiencing a sense of loss of control; (b) subjective bulimic episodes (SBEs), defined as experiencing loss of control while consuming smaller amounts of food; (c) objective overeating, defined as eating an objectively large amount of food without loss of control; and (d) subjective overeating, defined as eating a small amount of food without a sense of loss of control, which the individual believes is excessive (Fairburn and Cooper 1993). The EDE questions related to these four constructs probe details about the types and amount of food, the social context in which they occur, and feelings of loss of control during the episode. While the trained interviewer determines whether the food consumed constitutes an "objectively large" amount of food, the EDE includes an appendix, with standardized amounts of food that are considered objectively large. For example, the consumption of three main courses (e.g., three Big Macs) or more than one pint of ice cream would be considered large when rating OBEs.

The EDE also includes a module to evaluate the extra specifiers for BED if at least 12 OBEs have been present over the prior 3 months. Recurrent episodes of OBEs should be associated with three or more of the following: (1) eating more rapidly than usual, (2) eating until uncomfortably full, (3) consuming large amounts of food when not physically hungry, (4) eating alone because of embarrassment regarding amount of food, or (5) disgust with self, depressed, or guilty after binge episode. In addition, the level of distress regarding binge eating is assessed, and confirmation is obtained that binge episodes occur at least once per week for 3 months and that these episodes are not associated with compensatory behavior, as in BN, and do not occur exclusively during episodes of AN.

While the EDE has advantages, as the interviewer can assist in defining complicated eating disorder concepts and can probe the participant for additional clinical information, it also has disadvantages, as it requires extensive interviewer training to ensure competency (Fairburn et al. 2014). To achieve reliable and valid administration of this assessment, interviewers must demonstrate familiarity with the interview format, co-rating of interviews, and supervision from a previously EDE trained individual. The training requirements are a significant investment (20–30 h) in addition to the time it takes to administer the measure to each individual (~1–2 h), and in combination, may prove prohibitive in settings that are primarily involved in the provision of clinical care (Sysko and Alavi 2018). However, despite these limitations, the EDE (versions 12–16) shows evidence of strong psychometric properties, including norms on large samples with nonclinical populations, excellent inter-rater reliability (primarily kappas $\geq$ 0.85), use of multiple groups of judges to develop the instrument with quantitative ratings, and a preponderance of evidence supporting the use of the EDE in different demographic groups (e.g., age, gender, and ethnicity) and across multiple contexts (e.g., community and inpatient setting).

2.2 Structured Clinical Interview for DSM-5 (SCID-5)

The Structured Clinical Interview for DSM-5 (SCID-5; First et al. 2015) allows for the assessment and diagnosis of binge-eating disorders based on DSM-5 criteria. This assessment is available exclusively for purchase through the American Psychiatric Publishing. The SCID has been commonly used in research settings, particularly in earlier iterations for DSM-IV, though it has several limitations for the measurement of binge eating. First, it does not assess the overall frequency of binge eating as a stand-alone factor, only the presence or absence of this feature, and it does not provide guidance for quantifying whether a binge episode is large. Therefore, when using the SCID, clinicians must rely on their judgment to determine what constitutes a large amount of food. Additionally, data cannot be collected to quantify subjective binge eating using the SCID. The SCID, like the EDE, requires significant training for interviewers (~20–30 h) primarily because of the breadth of information and symptoms collected across DSM diagnoses,

which requires familiarity with a wide range of psychopathology. Furthermore, it is time consuming to administer and includes complicated skip logic that may lead researchers and clinicians to miss opportunities to capture important diagnostic information (Thomas et al. 2016). Thus, while the SCID is a useful measure for the diagnosis of eating and other psychiatric disorders, it cannot be used as an indicator of changes in symptom presentation. The prohibitive cost of the SCID is a limitation for many clinicians and researchers who need to use a free or inexpensive tool to collect clinically relevant information on patients. Psychometric data are not currently available for eating disorders based on the current version of the SCID. Inter-rater reliability of DSM-IV eating disorder diagnoses are good (kappa = 0.77), however, the test–retest reliability estimates for DSM-IV eating disorder diagnoses (correlation = 0.64) are not consistent with a rating of acceptable (minimum correlation over several days or weeks = 0.70; Zanarini et al. 2000).

2.3 Eating Disorder Assessment for the DSM-5 (EDA-5)

The Eating Disorder Assessment for the DSM-5 (EDA-5; Sysko et al. 2015) is an adaptive semi-structured interview that was developed to assess all DSM-5 feeding and eating disorders or related conditions in adults. The questions assess the current problem within the last 3 months. The measure requires limited training to administer and it is portable, accessible, and brief (~15 min; Sysko et al. 2015), which reduces the burden on the interviewer and the participant. The EDA-5 also is delivered in an electronic format that only elicits the information necessary to assign a diagnosis and therefore may offer additional utility in settings with more limited resources for assessment as compared to lengthier and more burdensome tools (Kornstein et al. 2016). Nonetheless, clinical judgment must be used when administering this measure.

The EDA-5 includes a section entitled "Binge Eating and Compensatory Behaviors." This section includes questions assessing loss of control while eating, specific types of foods eaten during this loss of control in order to distinguish between OBEs and SBEs, and the frequency of binge episodes. If the individual does not meet the criteria for AN, BN, or Avoidant/Restrictive Food Intake Disorder (ARFID), the interviewer then assesses for BED. This section, like the EDE BED module, includes yes/no questions about the following: rapid eating, eating until uncomfortably full, avoiding eating around others due to shame or embarrassment, negative affect associated with the episode, and marked distress regarding binge episode.

The EDA-5 has several advantages, particularly in comparison to several of the other available assessment tools discussed. Studies that compared the EDA-5 to the EDE and to unstructured clinical interviews indicate preliminary evidence of the validity (Sysko et al. 2015) and test–retest reliability of the EDA-5 (Sysko et al. 2015). The EDE-5 also includes an informative appendix entitled "Is it a binge?" that describes discriminating features of binge episodes in further detail and provides specific guidelines and examples for assessing lack of control and for discriminating between an OBE and an SBE. For example, an objectively large amount of food could be 2 pints of ice cream or 10 apples or 1 family-size bag of chips. In contrast, a subjectively large amount of food maybe 2 bowls of cereal or 3 slices of pizza, or 2 Big Macs. Despite its strengths, the EDA-5 has several limitations including a lack of data on the assessment of feeding disorders, limited data on efficiently distinguishing between case and non-case status, and minimal dimensional data (Sysko et al. 2015).

3 Self-Report Measures

3.1 Eating Disorder Examination-Questionnaire (EDE-Q)

The Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn and Beglin 1994, 2008) is a 38-item self-report measure based on the EDE

interview (Cooper and Fairburn 1987; Fairburn et al. 2014) and it is designed to be completed in 15 min (see Table 1 for more characteristics). This measure assesses symptoms over the past 28 days, including symptom frequency and severity. Diagnostic criteria assessed by the EDE-Q are provided in Table 1. The EDE includes questions such as, "Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?" and "On how many of these times did you have a sense of having lost control over your eating (at the time you were eating)?" The ease of administration of the EDE-Q supports its use to measure the course and outcomes of treatment for eating disorders.

The EDE-Q, similar to the EDE, contains four subscales: restraint, eating concern, shape concern, and weight concern, as well as a global score. The EDE-Q has been shown to discriminate successfully between individuals with and without eating disorders and the EDE-Q subscale scores positively correlate with EDE subscale scores (Forbush and Berg 2016). The EDE-Q has fewer items than the EDE and is by design less comprehensive, with a focus on identifying symptoms rather than collecting all of the information needed for a diagnosis. In the current version of the EDE-Q, information about large eating episodes with loss of control is collected to allow for the measurement of OBEs. Prior versions also evaluated SBEs.

The EDE-Q can be used in both research and clinical settings. Data exploring the differences between the EDE and EDE-Q have suggested differences in patient reports of complex behaviors, such as binge eating (Black and Wilson 1996; Carter et al. 2001; Fairburn and Beglin 1994; Wilfley et al. 1997). Other studies have demonstrated good agreement between the EDE and the EDE-Q for OBEs, but not for SBEs or overeating (Grilo et al. 2001a, b). As such, studies aiming to assess binge eating should consider utilizing the same measure (EDE or EDE-Q) if reliability in the measurement of binge eating over time is an important outcome of the research. When completed by the same individual across time points, the EDE-Q was found to be responsive enough to indicate if an individual has improved, recovered, deteriorated, or remained stable over time (Dingemans and vanFurth 2017). The EDE-Q can also be completed with or without a set of instructions, which provides specifications for determining OBEs. This enhanced version of the EDE-Q achieves similar results to the EDE interview. In contrast, the EDE-Q without instructions lacks correlation with the EDE, which further suggests a greater degree of variance in how respondents interpret the definition of a binge (Goldfein et al. 2005).

3.2 Eating Disorder Diagnostic Scale

The Eating Disorder Diagnostic Scale (EDDS; Stice et al. 2000) is a brief 22-item self-report scale to assess eating disorder symptoms over the prior 3 months. This assessment can be used to generate a diagnosis of BED, AN, BN, and an overall composite score for eating disorder symptoms. This measure was developed to diagnose eating disorders for etiological research, ongoing assessments in research, and for diagnosing individuals with eating disorders in clinical practice in both psychological and medical (primary care) settings (Stice et al. 2000).

The EDDS describes binge eating behaviorally rather than using the term "binge," in order to address problems stemming from the subjectivity in assessing binge eating by self-report (Peterson and Mitchell 2005). The most updated EDDS, based on the DSM-5, prompts the interviewee about eating unusually large amounts of food, loss of control, episode frequency, marked distress, and the five behavioral components of BED: rapid eating, eating until uncomfortably full, eating large amounts when not physically hungry, eating alone due to embarrassment, and feelings of disgust, depression, or guilt after eating. Diagnostic criteria assessed by the EDDS are provided in Table 1. The measure uses a diverse format of questions including questions rated on a Likert scale, dichotomous response questions, questions regarding symptom frequency (e.g., average number of times in the

Table 1 Characteristics and diagnostic criteria assessed by instruments used for screening or diagnosis

Instrument	Time to administer	Time frame assessed	OBE	SBE	Loss of control	Rapid eating	Eating until uncomfortably full	Consuming large amounts of food when not physically hungry	Eating alone due to shame and being embarrassed	Negative affect	Marked distress	Quantity of food	Frequency
Clinical interviews													
EDE	50–90	28 days	x	x	x	x	x	x	x	x	x	x	x
EDA-5	~15	3 mos.	x	x	x	x	x	x	x	x	x	x	x
Self-report measures													
EDE-Q	~15	28 days	x		x				x	x			x
EDDS	~15	3 mos.	x		x	x	x	x	x	x	x		x
EPSI	~20	28 days	x			x	x	x					
QEWP-R	~15	6 mos.	x		x	x	x	x	x	x	x		x
QEWP-5	~15	6 mos.	x	x	x	x	x	x	x	x	x	x	x

Note: *EDE* Eating Disorder Examination, *EDA-5* Eating Disorder Assessment for the DSM-5, *SCID* Structured Clinical Interview for DSM-5, *EDE-Q* Eating Disorder Examination-Questionnaire, *EDDS* Eating Disorder Diagnostic Scale, *EPSI* Eating Pathology Symptoms Inventory, *QEWP-R* Questionnaire on Eating and Weight Patterns—Revised, *QEWP-5* Questionnaire on Eating and Weight Patterns-5, *OBE* Objective Binge Eating, *SBE* Subjective Binge Eating

past 3 months that one ate an unusually large amount of food and felt a loss of control), and open-ended questions. To date, data regarding the psychometric properties of the most updated version of the EDDS, based on the DSM-5, are not yet available, but prior versions of the EDDS have examined the reliability and validity of the EDDS scores for DSM-IV diagnoses (internal consistency, alpha = 0.89; test–retest reliability, $r = 0.87$; Stice et al. 2000, 2004) and the measure is well suited for clinical practice because it is brief, straightforward to score, and freely available.

3.3 Eating Pathology Symptoms Inventory

The Eating Pathology Symptoms Inventory (EPSI; Forbush et al. 2013) is a 45-item self-report questionnaire that assesses eating disorder dimensions relevant to treatment outcome. This assessment measures eight subscale measurements including "Binge Eating," based on items assessing eating large amounts of food, eating until uncomfortably full, inability to resist eating food once offered, rapid eating, and accompanying cognitive symptoms (Forbush and Berg 2016). Diagnostic criteria assessed by the EPSI are provided in Table 1. While this measure assesses a construct labeled binge eating, it does not explicitly state these words in any of the questions, and some items may be better understood as mindless eating. Questions related to the "Binge Eating" subscale include, "I stuffed myself with food to the point of being sick," "I did not notice how much I ate until after I had finished eating," "I snacked throughout the evening without realizing it," and "I ate as if I was on autopilot."

Several studies have looked at the validity, reliability, and stability of the EPSI and found strong psychometric properties (Forbush et al. 2013, 2014). Studies have examined the reliability and validity of the EPSI scores for discriminating symptoms of DSM-IV diagnostic groups (Forbush et al. 2013, 2014) and the measure is appropriate for clinical practice.

3.4 Questionnaire on Eating and Weight Patterns

The Questionnaire on Eating and Weight Patterns-Revised (QEWP-R) is a 20-item self-report questionnaire that assesses symptoms of eating and weight disorders, including binge eating (Yanovski et al. 1993). The prompts inquire about eating unusually large amounts of food in a short period of time, loss of control, marked distress, frequency of binge eating, and the five behavioral components of BED: rapid eating, eating until uncomfortably full, eating large amounts when not physically hungry, eating alone due to embarrassment, and feelings of disgust, depression, or guilt after eating. Studies have supported the measure's psychometric properties and its ability to identify individuals who binge eat (Barnes et al. 2011; Elder et al. 2006).

While the measure was originally developed based on the DSM-IV criteria, it has since been adapted based on the DSM-5 criteria (QEWP-5, Yanovski et al. 2015). The QEWP-5 is a 26-item self-report measure that assesses the frequency and severity of binge eating and compensatory behaviors and assesses for a possible diagnosis of binge-eating disorder. Unlike many of the other assessments, it also asks respondents to "list everything you ate and drank during the [binge] episode." In contrast to the QEWP-R, this measure includes questions that assess feelings of loss of control over eating, even in the absence of consuming an objectively large amount of food. As such, the key difference between the QEWP-R and QEWP-5 is the additional questions focusing on SBEs and the feelings and behavioral symptoms surrounding the episode. Specifically, this measure asks "During the past 3 months, how often did you have…the feeling that your eating was out of control, but you did not consume what most people would think was an unusually large amount of food." Notably, while the QEWP-5 can be used as a screening instrument in both the research and clinical settings, it should not be used to make a diagnosis in the absence of a more comprehensive

clinical interview as it is sensitive, but not specific for a BED diagnosis (Yanovski et al. 2015).

3.5 Self-Monitoring

Self-monitoring is a common tool used in cognitive-behavioral therapy to assess eating behaviors, whereby patients record all food intake and related information in real time. Self-monitoring records completed by patients and in the context of a cognitive-behavioral treatment include the time of day one eats or drinks, exactly what one ate or drank, where and when the food or drink was consumed, meals or snacks that felt excessive, use of vomiting, laxatives and/or diuretics, and anything that seems to be influencing eating (Fairburn et al. 2014). Self-monitoring can provide important information about binge eating episodes and can lead to changes in eating behaviors (Fairburn et al. 2014). This assessment tool may reduce inaccuracies related to retrospective recall of binge eating that can arise when using other assessment measures (e.g., EDE; Wilson and Vitousek 1999). Self-monitoring is most commonly used in the clinical setting and is useful for case conceptualization, treatment planning, and ongoing assessment of eating behaviors (Fairburn et al. 2003), but could also be employed in research settings to capture daily data on binge eating.

Self-monitoring has been shown to be effective for reducing binge eating episodes in cognitive behavior therapy-guided self-help (CBT-GSH; Hildebrandt and Latner 2006; Latner and Wilson 2002); however, traditional self-monitoring can be time consuming and inconvenient to integrate and adhere to on a daily basis outside of the therapy context. While self-monitoring has historically been administered using paper and pencil format, in recent years there has been the development and implementation of smartphone-based technology to approximate traditional methods (Fairburn and Rothwell 2015). Ecological Momentary Assessment (EMA; Engel et al. 2016; Farchaus and Corte 2003; Smyth et al. 2001) allows for recording eating behavior and/or binge eating in real time using smartphone-based technology (Fairburn and Rothwell 2015; Farchaus and Corte 2003). For example, Noom Monitor is a smartphone application developed to facilitate guided self-help treatments by simplifying and digitizing self-monitoring records (Hildebrandt et al. 2017), which may increase accessibility and adherence, and reduce treatment burden.

4 Laboratory Eating

Binge eating can also be assessed in vivo through laboratory studies of eating behavior, which offer a clinically useful alternative to self-report or other subjective assessments (see also Sysko et al. 2018). Feeding laboratory paradigms allow for an objective real-time assessment of eating behavior. They also may enhance the scientific rigor and reproducibility of the data by minimizing recall errors or bias and by quantifying behaviors that may be difficult to capture accurately in questionnaires or interviews, such as the size of the episode or the degree of loss of control experienced during a binge episode.

In a laboratory eating assessment, participants are provided with a single food item (e.g., yogurt shake) or an array of foods (multi-item meals) in a standardized way (e.g., amount of food, type of food, instructions), and behavior is monitored (see Sysko et al. 2018 for further details). Although individuals with BED and BN are instructed to eat in a manner consistent with a binge episode, binge eating may not occur naturally in this setting. Several experimental adjustments are made to capture behavior that is more consistent with an episode of loss of control eating. For example, in a multi-item meal, foods typical of binge eating episodes (e.g., ice cream, cookies, and chips) are provided in amounts that are larger than with a normal meal (e.g., 11,342 kcal, Sysko et al. 2013), and participants are asked to not eat anything for several hours before the meal to approximate the dietary restriction that often precedes binge episodes. In addition, participants may complete multiple meals in the laboratory to increase comfort with the experience, or be provided with access to a bathroom to ensure that an inability to self-induce vomiting is not a barrier to participation. Following the

meal, participants are asked how typical the laboratory meal was in comparison to binge eating episodes that occur outside the laboratory, with only those considered to be "moderately," "very," or "extremely" typical classified as a binge episode. Common outcome measures from this assessment include total kilocalorie and macronutrient composition of food consumed, as well as meal timing and the types and order of foods consumed.

Studies have shown that individuals diagnosed with BED and BN consistently engage in objectively distinct and abnormal eating behavior in the laboratory setting. Several characteristics are particularly notable, including total energy consumed, macronutrient patterns, and rate of eating. Individuals with BED consume more than overweight or obese individuals without BED. For example, in a laboratory binge meal, BED patients consumed 943.15 + 271.44 g, obese controls consumed 552.06 + 252.16 g, and normal-weight controls consumed 475.83 + 161.04 g (Sysko et al. 2007b). Binge size correlates significantly and positively with body mass index (BMI) among patients with BED (Guss et al. 2002), and in-laboratory binge meals among patients with BED are characterized by consuming a higher proportion of energy from fat and a lower proportion from protein compared with those of controls (Yanovski et al. 1992). Similarly, when asked to binge eat, individuals with BN consume far greater amounts of food and a smaller fraction of energy derived from protein than do healthy individuals who are instructed to "let themselves go" (Van der Ster et al. 1994; Walsh et al. 1989). Individuals with BN tend to initiate in-laboratory meals with dessert and snack foods, in contrast to healthy controls, who typically start with fish and meat (Hadigan et al. 1989). Additionally, individuals with BN demonstrate an accelerated rate of food consumption during binge episodes, particularly when provided with a single-item liquid meal (Kissileff et al. 1986; Walsh et al. 1989). Interestingly, while individuals with BED consume significantly more food during their binge meals than comparable controls, this appears primarily due to meals lasting significantly longer than those of controls, rather than to a faster rate of eating (Walsh and Boudreau 2003).

Measures of eating behavior in a laboratory setting have been shown to be sensitive and reproducible. For example, effect sizes for energy (in kcal) consumed in a binge meal as compared with eating by healthy individuals were large both in a study of BN ($d = 1.4$, Sysko et al. 2017) and of BED ($d = 1.5$, Sysko et al. 2007a), even with modest sample sizes.

Other subjective and objective outcome measures can also be used in combination with meals administered in this setting to provide a more comprehensive assessment of eating among individuals with BED and BN. For example, visual analog scales (VAS) capture subjective responses to eating such as hunger, fullness, sickness, and loss of control. Among individuals with BED, hunger and fullness ratings were generally similar to those of healthy controls (with some exceptions, e.g., Guss et al. 2002), but unlike controls, participants with BED do not use these signals to terminate the meal (Samuels et al. 2009; Sysko et al. 2007b).

Along with intake and subjective measures, a wide range of physiological measures can be assessed during laboratory meals, including the sympathetic/parasympathetic state, physiological markers of stress, and gastrointestinal humoral factors (e.g., CCK, ghrelin, GLP1). Measurements of appetitive hormones and gastrointestinal function during laboratory meals have elucidated the psychobiology of maladaptive eating and identified potential markers of abnormal eating and recovery. For example, abnormalities in the development of satiety during a single-item meal have been documented among patients with BN across multiple domains, including release of the hormone cholecystokinin (CCK; Devlin et al. 1997; Geracioti and Liddle 1988; Keel et al. 2007), gastric emptying (Cuellar et al. 1988; Devlin et al. 1997; Geliebter et al. 1982; Inui et al. 1995), gastric capacity (Geliebter et al. 1982), and gastric relaxation (Walsh et al. 2003). These biological variables also can be assessed longitudinally and may provide a useful metric for detecting improvement among patients with eating disorders.

While laboratory meals provide a controlled setting for the momentary assessment of eating behaviors in a reliable manner, this approach has several limitations. First, in-laboratory binge eating episodes lack ecological validity, as they are intrinsically artificial and occur outside of the natural environment. Additionally, there are few laboratory eating studies with adolescent samples (Tanofsky-Kraff et al. 2011), and it is therefore unknown whether the results of research in adults with eating disorders generalize across different stages of development. Despite large effects, prior research samples are generally small and homogenous, with primarily female and Caucasian participants. Finally, numerous challenges in conducting laboratory eating behavior studies (e.g., cost of setting up a lab, time to execute lab-based meals, training for staff to ensure standardization) limit the broad use of this type of assessment (Sysko and Alavi 2018).

5 Conclusion

Future research may help to refine existing measures to increase accessibility and usability for clinical and research purposes. Further, studies to better understand the limits of existing assessment tools (e.g., examining the psychometrics of self-reported binge eating on the basis of gender or other demographic characteristics; Hildebrandt and Craigen 2015) would help inform the selection of a measure of binge eating in a way that is not currently possible. Additionally, adaptive assessments (e.g., Gibbons et al. 2016) that can focus on measures that quickly and accurately assess binge eating could reduce the burden placed on the patient and the provider and ensure the availability of standardized assessments in a wider range of care settings. In conclusion, a number of structured clinical interviews, self-report instruments, and objective measures, such as laboratory eating paradigms, are useful in the assessment of binge eating. Although a wide range of assessment tools is useful, as described above, important differences and pros and cons exist between the measures. The assessments measure different aspects of eating behaviors (e.g., OBEs/SBEs) and vary in the number of questions that assess binge eating, other diagnostic symptoms, frequency, and severity (Table 1). Furthermore, many of the measures require extensive training and time to administer, which may impact their feasibility for routine use. Therefore, clinicians and researchers must be thoughtful in selecting an appropriate measure for diagnosis (e.g., of BED), case conceptualization, ongoing assessment (e.g., changes in frequency/severity of binge episodes), treatment planning, or evaluation of treatment outcome.

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