




SYSTEMATIC REVIEW

Open Access



Comorbidity of binge eating disorder and other psychiatric disorders: a systematic review

Ewelina Kowalewska^{1*} , Magdalena Bzowska¹, Jannis Engel²  and Michał Lew-Starowicz¹ 

Abstract

Objective Binge eating disorder (BED), although relatively recently recognized as a distinct clinical syndrome, is the most common eating disorder. BED can occur as a separate phenomenon or in combination with other mental disorders, adding to the overall burden of the illness. Due to the relatively short history of recognizing BED as a distinct disorder, this review aimed to summarize the current knowledge on the co-occurrence of BED with other psychiatric disorders.

Method This review adhered to the PRISMA guidelines. Multiple databases, such as MEDLINE, MEDLINE Complete, and Academic Search Ultimate, were used to identify relevant studies. Of the 3766 articles initially identified, 63 articles published within the last 13 years were included in this review. This systematic review has been registered through INPLASY (INPLASY202370075).

Results The most frequently observed comorbidities associated with BED were mood disorders, anxiety disorders and substance use disorders. They were also related to more severe BED presentations. Other psychiatric conditions frequently associated with BED include reaction to severe stress and adjustment disorders, impulse control disorder, ADHD, personality disorders, behavioral disorders, disorders of bodily distress or bodily experience, and psychotic disorders. Additionally, BED was linked to suicidality and sleep disorders.

Discussion The findings highlight the interconnected nature of BED with various psychiatric conditions and related factors, shedding light on the complexity and broader impact of BED on mental health and the need for appropriate screening and appropriately targeted clinical interventions.

Keywords Binge eating disorder, Comorbidity, Mental disorders, Mood disorders, Anxiety disorders, Substance use disorders

Introduction

The understanding of eating disorders (EDs) has evolved significantly in the past decade. In conjunction with the clearly defined bulimia nervosa (BN) and anorexia nervosa (AN), the latest revisions, such as the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [1] released in May 2013 and the 11th revision of the World Health Organization's International Statistical Classification of Diseases and Related Health Problems (ICD-11) published in 2019 [2], introduce a distinct

*Correspondence:

Ewelina Kowalewska
ewelina.kowalewska@cmkp.edu.pl; ewelina.kowalewska1@gmail.com

¹ Department of Psychiatry, Centre of Postgraduate Medical Education, Warsaw, Poland

² Department of Psychiatry, Social Psychiatry and Psychotherapy, Division of Clinical Psychology and Sexual Medicine, Hannover Medical School, Hannover, Germany



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

category known as binge eating disorder (BED). A comparison of the DSM-5 and ICD-11 diagnostic criteria for BED is shown in Table 1. The introduction of the BED diagnosis was prompted by a significant factor: in earlier iterations of diagnostic systems, the classification of Eating Disorder Not Otherwise Specified (EDNOS) occurred most frequently. Consequently, numerous patients exhibit symptoms of an ED but do not meet the criteria for BN or AN [3]. Empirical studies have demonstrated the utility of incorporating BED into the classification of EDs [3]. Despite being recognized relatively recently as a distinct clinical syndrome, BED stands out as the most prevalent ED in the United States, with a lifetime incidence of 2.8%, surpassing the rates of BN (1%) and AN (0.6%) [4]. Moreover, BED potentially has the highest prevalence among EDs globally, boasting a lifetime prevalence of 1.9%, in contrast to the prevalence of 1% for BN [4]. Like in BN and AN, BED occurs more frequently in women than in men, with a lifetime incidence of 3.5% for women compared to 2% for men [5]. Importantly, in both the DSM-5 and ICD-11, the diagnoses of BED and BN are considered mutually exclusive, meaning that during single episodes, only one of the disorders can be assigned; ICD-11 extends this exclusion to AN. Notably, healthcare professionals face significant deficits in knowledge and

awareness regarding BED [6]. This lack of awareness, coupled with feelings of shame, constitutes a primary obstacle preventing most affected individuals from receiving the necessary treatment, despite the existence of effective interventions for BED [6].

BED is a condition characterized by intricate interactions between genetic factors and environmental influences. On the one hand, there are indications pointing to a genetic predisposition [7, 8]. Conversely, the prevalence is significantly influenced by the socio-cultural environment and the values practiced within it [9]. For instance, migrants in Australia exhibit a lower incidence of EDs than individuals born in the country [10]. Additionally, specific sociocultural groups, such as Latinos and Blacks, have higher prevalence rates than does the general population [9]. BED may occur not only as a separate phenomenon but also in combination with other mental disorders, adding complexity to the overall burden of the disease. Given the relatively brief history of conceptualizing BED as a distinct disorder, this review aimed to systematize the current knowledge regarding the co-occurrence of BED with other psychiatric disorders. The significance of this article is emphasized by the pivotal role that assessing comorbidities plays in treating BED. Tailored therapies designed to enhance the effectiveness of BED treatment

Table 1 DSM-5 and ICD-11 criteria for binge eating disorder

DSM-5	ICD-11
<p>1. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:</p> <ol style="list-style-type: none"> Eating, in a discrete period of time (e.g., within any 2-h period), an amount of food that is definitely larger than most people would eat in a similar period of time under similar circumstances The sense of lack of control overeating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating) <p>2. Binge-eating episodes are associated with three (or more) of the following:</p> <ol style="list-style-type: none"> Eating much more rapidly than normal Eating until feeling uncomfortably full Eating large amounts of food when not feeling physically hungry Eating alone because of being embarrassed by how much one is eating Feeling disgusted with oneself, depressed, or very guilty after overeating <p>3. Marked distress regarding binge eating is present</p> <p>4. The binge eating occurs, on average, at least 1 day a week for 3 months</p> <p>5. The binge eating is not associated with the regular use of inappropriate compensatory behavior (e.g., purging, fasting, excessive exercise) and does not occur exclusively during the course of anorexia nervosa or bulimia nervosa</p> <p>Severity Grading</p> <ul style="list-style-type: none"> Mild: 1 to 3 episodes per week Moderate: 4 to 7 episodes per week Severe: 8 to 13 episodes per week Extreme: 14 or more episodes per week 	<p>Binge eating disorder is characterized by frequent, recurrent episodes of binge eating (e.g., once a week or more over a period of several months). A binge eating episode is a distinct period of time during which the individual experiences a subjective loss of control overeating, eating notably more or differently than usual, and feels unable to stop eating or limit the type or amount of food eaten.</p> <p>Binge eating is experienced as very distressing and is often accompanied by negative emotions such as guilt or disgust.</p> <p>However, unlike in Bulimia Nervosa, binge eating episodes are not regularly followed by inappropriate compensatory behaviors aimed at preventing weight gain (e.g., self-induced vomiting, misuse of laxatives or enemas, strenuous exercise).</p>

can be developed only by thoroughly considering and addressing comorbidities.

Methods

This review was performed according to the updated version of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA 2020 Statement) [11].

Search strategy and selection process

We identified relevant studies using multiple databases, including MEDLINE, MEDLINE Complete, and Academic Search Ultimate. The search strings used were ‘binge eating disorder’ AND ‘mental health OR mental illness OR mental disorder OR psychiatric illness’.

Due to the inclusion of BED in the DSM-5, our analysis initially centered on studies from 2013 onwards. However, recognizing significant studies incorporating proposed criteria before official inclusion, we extended the scope to 2010. Eventually, ongoing analysis led to further extension to 2023, with the final literature search encompassing studies published between

January 1, 2010, and April 30, 2023. The details concerning the selection process are outlined in Fig. 1.

Inclusion and exclusion criteria

The searching strategy and criteria for inclusion and exclusion were established in accordance with the PICO framework, as recommended by the Cochrane Library for systematic reviews [12]. This framework encompasses the population, intervention, comparator, and outcome of interest (see Table 2). We included articles published in English and within the past 13 years. Articles were excluded if they (1) were not related to BED, (2) did not present empirical data, (3) were not scientifically peer reviewed, (4) were duplicated, (5) did not have full-text available, (6) were not related directly to the subject of the review, or (7) put emphasis on bariatric patients. Out of the 3766 articles found during the initial search, only 63 remained after the application of inclusion/exclusion criteria and were included in the final review.

Results

We analyzed the articles in terms of the co-occurrence of BED with other psychiatric disorders. The selected articles addressed issues related to psychiatric comorbidities,

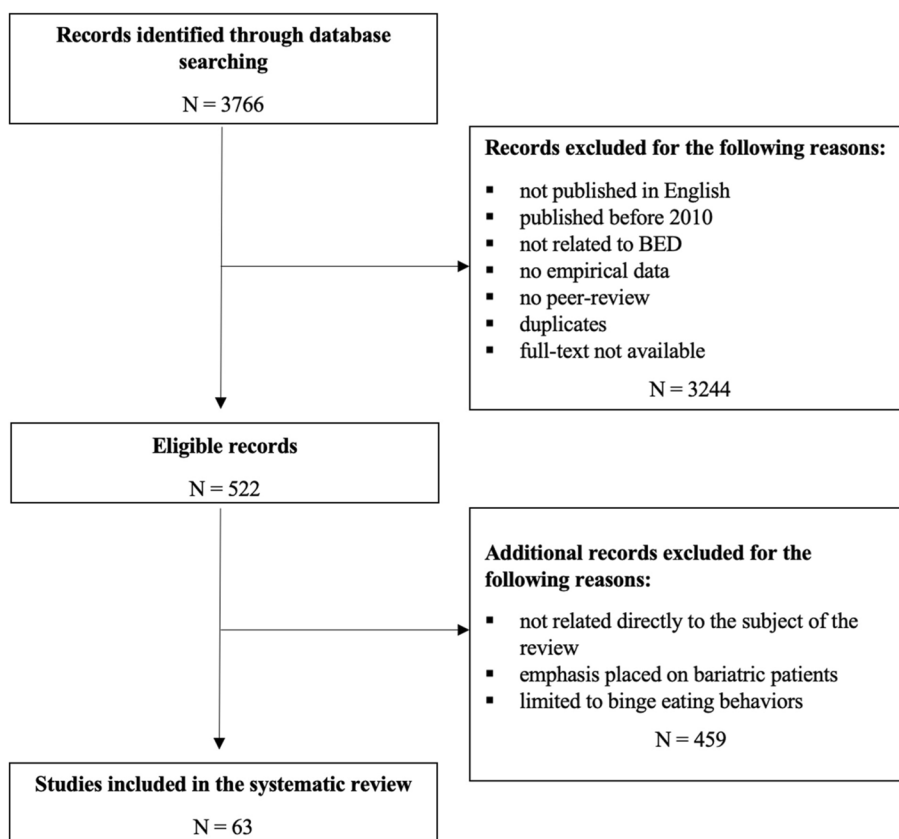


Fig. 1 Prisma flow chart

Table 2 The final inclusion and exclusion criteria using the PICO method

Criteria	Inclusion	Exclusion
Population	Human, any age, any gender	Animal
Intervention	Following types of studies were included: experimental, RCT, cross-sectional, cohort, case-control	Not applicable
Comparison	Not applicable	Not applicable
Outcome	Co-occurrence of BED with other psychiatric disorders	Studies not related to BED
Date	Cutoff date limit of January 1, 2010—April 30, 2023 were applied	Before January 1, 2010
Language	Only studies written in English were included	Non-English language publications

such as other feeding or EDs, mood disorders, anxiety, or fear-related disorders (ADs), disorders specifically associated with stress, impulse control disorders, attention deficit hyperactivity disorder (ADHD), substance use disorders, personality disorders, behavioral disorders, disorders of bodily distress or bodily experience, and schizophrenia. Moreover, associations between BED and suicidal thoughts and behaviors, and sleep disorders were observed.

BED as a main diagnosis

Thirty-two articles describing the comorbidity of BED and other psychiatric disorders involved participants with BED as a main diagnosis [13–44] (Table 3).

The most common comorbid psychiatric condition among individuals with BED reported in twenty-nine articles was mood disorders [14–25, 27–41, 43, 44]. Sixteen articles examined the relationship between BED and anxiety disorders [14, 16, 18, 19, 24, 25, 27, 28, 30–34, 37, 40, 44], and thirteen examined substance use disorders [14–17, 24, 28, 30, 31, 33, 34, 37, 40, 44]. Twelve articles described the occurrence of symptoms of personality disorders among individuals with BED [13–15, 17, 18, 28, 29, 32, 33, 36, 40, 42]. Five articles indicated the relationship between BED and posttraumatic stress disorder, acute stress disorder or/and adjustment disorders [17, 26, 28, 37, 40]; two articles reported the incidence of attention deficit hyperactivity disorder among individuals with BED as well as relationships between BED and schizophrenia [28, 37]. One article highlighted the prevalence of impulse control disorders among BED individuals [30], and another two articles showed the association between BED and behavioral disorders [37, 40]. In addition to the abovementioned psychiatric conditions, two studies assessed sleep disorders among BED individuals [18, 32], and one article assessed suicidality [37]. The data are summarized in Table 3.

Other clinical and community samples with comorbid BED

Thirty-one articles were found in the case of individuals without BED as a main diagnosis [88–118]. Ten studies examined the prevalence and correlates of BED in clinical

samples of patients suffering from other psychiatric conditions [88–97] (Table 4). Six of them included samples of patients with mood disorders [88–92, 97], two studies included patients with OCD [93, 94], and one study assessed BED among patients with heroin use disorder [95]. In summary, the abovementioned studies, which included clinical samples, showed the comorbidity of BED with anxiety disorders, substance use disorders, ADHD, post-traumatic stress disorder (PTSD), behavioral disorders, impulse control disorders, disorders of bodily distress or bodily experience, psychotic disorders, and suicidality.

Twelve articles reported data on the prevalence and correlates of BED in population-based samples [98–109]. These studies showed the associations of BED with mood disorders, anxiety disorders, substance use disorders, behavioral disorders, PTSD, and ADHD.

Seven articles presented in Table 4 included samples of children and/or adolescents [96, 98, 99, 101, 103, 104, 108] and reported data indicating that among these groups, BED co-occurs with mood disorders, anxiety disorders, ADHD, substance use disorders, behavioral disorders, and suicidality.

Finally, nine articles described the results of studies conducted on community samples [110–117]. Mood disorders, anxiety disorders, behavioral disorders, PTSD, substance use disorders, ADHD, suicidality, psychotic disorders, and sleep problems were found among the correlates of BED in these groups.

Discussion

To the best of our knowledge, this is the first review aimed at consolidating current insights into the comorbidity of BED with other psychiatric disorders. An examination of 63 articles published in the last 13 years revealed associations between BED and various mental disorders, with mood disorders (55 articles), anxiety disorders (36 articles), and substance use disorders (31 articles) emerging as the most prevalent coexisting diagnoses with BED. Other psychiatric conditions that have been found to co-occur with BED include reaction to severe stress and adjustment disorders, impulse control

Table 3 Co-occurrence of BED with other psychiatric disorders

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[13]	EDHI	MMPI-2				■								BED: 55 women, 5 men	cross-sectional	<ul style="list-style-type: none"> ■ Several putative psychotic phenomena were reported in the sample of binge eaters, and they were related to higher scores on several dimensions of the EDI-2. ■ At least in some patients, there might be an overlap between some basic phenomena of psychosis (disordered sense of basic self, of bodily experiences, and hyperreflexivity), and those basic disturbances in identity development and Self-schemas which are at the base of eating disorders. ■ Depression, Hypochondriasis, Psychopathic Deviation, Schizophrenia, Psychasthenia, and Paranoia receiving the highest mean scores.

Table 3 (continued)

Reference	BED diagnosis (and measures of other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[14]	SCID- <i>MP</i> /EDE	BDI, DIPD-IV	■	■	■	■	■							BED: 259 women, 88 men	cross-sectional	<ul style="list-style-type: none"> ■ 15% of the sample showed symptoms of avoidant personality disorder features, 12% showed symptoms of obsessive-compulsive personality disorder features, 8% showed features of both disorders, and 66% showed features of neither.
[15]	SCID- <i>MP</i> /EDE	BDI, DIPD-IV	■		■	■								BED: 259 women, 88 men	cross-sectional	<ul style="list-style-type: none"> ■ 129 patients showed a co-occurring mood disorder, 34 – substance use disorders, 60 - both, and 124 - neither. ■ Groups differed on personality disorder features - the highest frequencies were found among those having mood disorder and both mood and substance use disorders. ■ Groups differed in ED pathology (not in BMI and binge-eating (BE) frequency) – groups with mood disorder and both comorbidities demonstrated high concerns on r eating, weight, or shape.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[16]	SCID-IV/P, EDE, WEH, QEWP-R, FHRDCI	BDI	■	■	■									BED: 127 overweight women, 39 overweight men	cross-sectional	<ul style="list-style-type: none"> ■ BED patients with a family history of AD were significantly more likely than BED patients without a family history of AD to have lifetime diagnoses of AD and MD but not SUD. ■ A family history of anxiety was not significantly associated with timing or sequencing of age at onset of AD, BE, dieting, or obesity, or with variability in current levels of BE, ED psychopathology, or psychological functioning.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[17]	SCID-IP (SCID-II), EDEQ	BDI-II	■		■	■			■					BED & substance use disorders: 30 women, 8 men	experimental, uncontrolled trial	<ul style="list-style-type: none"> ■ The participants' primary problematic substance was alcohol (75%), followed by cannabis (36.4%). ■ The most common comorbid Axis I category was depression (41%), followed by PTSD (33.3%). ■ The most frequently observed Axis II category was avoidant personality disorder (20.5%) and depressive personality disorder (20.5%). ■ After 6-week group Mindfulness-Action Based Cognitive Behavioral Therapy (MABCBT) participants significantly improved on measures of objective BE episodes, disordered eating attitudes, alcohol and drug addiction severity, and depression.

Table 3 (continued)

Reference	BED diagnosis (and measures of other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[18]	ED-HI, + DSM-IV criteria for BED	BDI, SCL-90, NEO-PI-R	■	■	■	■				■				BED: 212 women on admission of a CBT day-treatment program for BED. (182 women completed the treatment)	naturalistic follow-up study	<ul style="list-style-type: none"> Higher scores on depressive symptoms, agoraphobia and extraversion were significantly related to less improvement. The analyses show that the level of social embedding and psychopathological comorbidity (state and trait) were predictors for treatment outcome.
[19]	Mini-DIPS, EDE-Q	BDI, BAI	■	■										BED: 36 women, 5 men	experimental, randomized controlled trial	<ul style="list-style-type: none"> At baseline, 33% of the patients suffered from at least one additional mental disorder, and 24% at a 4-year follow-up. Short-term CBT is efficacious over a 4-year follow-up period with respect to core symptomatology, ED pathology and depressive symptoms.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[20]	SCID-IP	PAI Depression Scale	■											BED: 105 overweight women	cross-sectional	<ul style="list-style-type: none"> ■ 67.27% of women showed lifetime history of depression. ■ After controlling for age and body-mass index (BMI), depressive symptoms were significantly associated with greater medication use (excluding antidepressants).
[21]	EDE-Q, TFEQ	BDI	■											No ED: 123 overweight women BED: 47 women who do not overvalue shape/weight, 101 women who overvalue shape/weight BN: 53 women	cross-sectional	<ul style="list-style-type: none"> ■ Both BED groups showed significantly greater ED psychopathology compared to the overweight group. ■ Within BED, the group with overvaluation showed significantly higher ED psychopathology and depressive levels despite no differences in BE. ■ BED with overvaluation and BN groups differed little from each other, despite having significantly higher ED psychopathology and depressive levels than the other groups.

Table 3 (continued)

Reference	BED diagnosis (and measures of other eating behaviors/ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[22]	SCID-IP, EDE	BDI	■											Mild BED: 247 women, 84 men Moderate BED: 294 women, 101 men Severe/extreme BED: 82 women, 26 men	cross-sectional	<ul style="list-style-type: none"> Higher ED psychopathology has been found in the severe/extreme BED groups (compared to moderate and mild groups). Higher depression has been found in moderate and severe/extreme groups (compared to the mild group) Participants characterized with overvaluation (54% of the sample) versus without overvaluation (46% of the sample) did not differ significantly in age, sex, BMI, or BED frequency, but had significantly greater ED psychopathology and depression.
[23]	EDE-Q, QEWP-R	BDI	■											Mild BED: 235 women, 29 men Moderate BED: 57 women, 10 men Overvaluation of shape/weight: 173 women, 23 men No overvaluation of shape/weight: 114 women, 16 men	cross-sectional	<ul style="list-style-type: none"> The moderate severity group showed greater ED psychopathology but not depression compared to the mild group. The overvaluation group showed significantly greater ED psychopathology and depression compared to the non-valuation group.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[24]	SCID-IV/P, EDE-Q		■	■	■									BED & current depressive disorder: 35 women, 5 men	experimental, randomized, 12-week double-blind placebo-controlled trial	<ul style="list-style-type: none"> ■ The most prevalent depressive disorder diagnosis was recurrent major depressive disorder (63%), followed by single episode of major depressive disorder (23%), and dysthymic disorder (13%). ■ 30% of the sample showed a lifetime AD, 13% had lifetime SUD. ■ Treatment with Duloxetine (mean 78.7 mg/day) was superior to placebo in reducing weekly frequency of BE days, BE episodes, weight, and Clinical Global Impression-Severity of illness ratings for BE, and depressive disorders. ■ Groups did not differ in terms of changes in BMI and measures of eating pathology, depression, and anxiety.

Table 3 (continued)

Reference	BED diagnosis (and measures of other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[25]	SCID-IV/P, EDE		■	■										BED: 20 elderly women	case-control	<ul style="list-style-type: none"> ■ Elderly women with BED reported an average (SD) of 4.5 (2.9) BE episodes per week. ■ The most frequent comorbid psychiatric conditions were mood disorders. ■ Current depression was diagnosed in 15% of the sample, associated lifetime depression in 45% of the sample.
[26]	EDE	CTQ, SCID-I							■					BED: 92 women 20 men	cross-sectional study	<ul style="list-style-type: none"> ■ Histories of childhood abuse and PTSD each predicted poorer BE treatment outcome and the association between childhood abuse history and BE treatment outcome differed by PTSD history, such that the association was observed only among participants with a history of PTSD. ■ Patients with trauma histories benefit less from existing psychotherapy approaches for BED than those without trauma histories, as well as suggest that PTSD may be more influential than the trauma exposure itself.

Table 3 (continued)

Reference	BED diagnosis (and measures of other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[27]	EDE-Q	SCID-IV/NP	■	■										BED: 151 women Mood/anxiety disorders: 102 women No psychiatric disorders: 259 women	cross-sectional	<ul style="list-style-type: none"> ■ At the latent level, BED was co-occurring with, yet distinct from, affective and anxiety disorders and was not characterized by an underlying affective or anxiety disorder.
[28]	diagnosis based in ICD-10 criteria		■	■	■	■	■	■	■	■			■	AN: 720 individuals BN: 402 individuals BED: 561 individuals HC without psychiatric disorder: 15 500 individuals	retrospective study	<ul style="list-style-type: none"> ■ Individuals with binge-type ED showed higher polygenic scores than controls for other psychiatric disorders, including depression, schizophrenia, and attention deficit hyperactivity disorder, and higher polygenic scores for body mass index
[29]	EDE, EDE-Q	CES-D	■			■								BED: 255 women	cross-sectional	<ul style="list-style-type: none"> ■ Higher levels of interpersonal problems were related to greater NA, and greater NA was associated with higher frequency of BED symptoms and psychopathology. ■ Patients with BED showed higher levels of interpersonal problems, depression, and ED psychopathology than nonclinical samples.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[30]	SCID-I, TFEQ	BDI	■	■	■							■		PD: 33 women BED: 41 women No ED: 35 women	cross-sectional	<ul style="list-style-type: none"> ■ ED groups reported significantly greater depressive symptoms, body dissatisfaction, and dietary restraint and more Axis I disorders compared with controls. ■ Compared with both the obese and normal weight BED groups, PD reported significantly greater dietary restraint and body dissatisfaction. ■ Compared with obese BED, PD reported lower prevalence of impulse control disorders. ■ All three ED groups reported significantly greater levels of depression on the BDI than the control group, but no significant differences were found among the ED group.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[31]	Questionnaire including number of items on ED symptoms and behaviors based on the DSM-IV criteria. Incidence BED-those who met criteria for BED during pregnancy but did not do so in the 6 months period prior to pregnancy.	Hopkins Symptom Checklist-25	■	■	■	■								BED Incidence: 931 women BED Continuation: 956 women BED Remission: 605 women No ED: 43152 women	cross-sectional	<ul style="list-style-type: none"> ■ Incidence of BED was significantly associated with lifetime history of being a victim of sexual or physical abuse, symptoms of major depression, symptoms of anxiety and depression, low life satisfaction, low self-esteem, low partner relationship satisfaction, smoking, alcohol use, lack of social support, and several weight-related factors.
[32]	ED-I	BDI-I, SCL-90, NEO-PI-R	■	■	■	■					■			BED: 304 treatment-seeking patients (92.7% women)	naturalistic, observational, follow-up	<ul style="list-style-type: none"> ■ Higher levels of drive for thinness, higher levels of interoceptive awareness, lower levels of BE pathology and, in women, lower levels of body dissatisfaction predicted better outcome in the short and longer term.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[33]	EDE	SCID-I, MCM-III	■	■	■	■								BED: 17 women BN: 17 women	cross-sectional	<ul style="list-style-type: none"> ■ Most common clinically significant trait in the BED sample was depressive personality; then avoidant and dependent. ■ AD were the most common psychiatric diagnoses (47.1% of BED sample), followed by MD (23.5% of BED sample) and substance use disorders (5.9% of BED sample).
[34]	SCID-I, EAT-40, EDI-II, BITE	SCL90-R	■	■	■									BED: 34 women BN-P: 34 women BN-NP: 34 women	cross-sectional	<ul style="list-style-type: none"> ■ A gradient in psychopathological scores emerged with BN-P patients having higher pathological scores on the SCL-90-R, followed by BN-NP and BED patients.

Table 3 (continued)

Reference	BED diagnosis (and measures of other eating behaviors/ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[35]	SCID-IV/P	BDI	■											BED: 182 overweight women, 73 overweight men	cross-sectional	<ul style="list-style-type: none"> ■ 25.9% of the sample was mildly depressed, 18% was moderately depressed, and 8.2% was severely depressed, measured with BDI. ■ Higher weight bias internalization was associated with poorer self-reported health on all SF-36 scales; BDI scores mediated the relationship. ■ WBIS scores mediated the relationship between BDI scores and three SF-36 scales.
[36]	EDE, EES, QEWP	BDI, SCID-II	■		■									BED: 86 women, 15 men	experimental, randomized uncontrolled clinical trial	<ul style="list-style-type: none"> ■ Analyses identified two moderators of posttreatment outcome, namely, Avoidant Personality Disorder or an earlier onset of overweight and dieting (<15 years old) evidenced significantly worsened outcome when treated with ACGT versus DBT-BED.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[37]	QEWP-R	MINI-Kid	■	■	■	■	■	■	■	■	■	■	■	Adolescents with ED AN: 32 individuals BN: 104 individuals BED: 51 individuals	cross-sectional study	<ul style="list-style-type: none"> ■ Patients diagnosed with BN or BED showed a higher prevalence of any psychiatric comorbidity (the highest MDD). ■ Patients diagnosed with BED had the highest prevalence of ADHD and adjustment disorder, compared to BN and AN. ■ The individuals with BED and ADHD showed a higher prevalence of obesity, compared to individuals with BED without ADHD.
[38]	Study 1: EDE Study 2: SCID-IP	IDS	■											BED: 122 women, 17 men (community sample)	observational, cross-sectional	<ul style="list-style-type: none"> ■ Participants with long duration of BE episodes (compared to those with short duration) exhibited greater symptoms of depression and lower self-esteem but did not differ on other measures of ED symptoms.

Table 3 (continued)

Reference	BED diagnosis (and measures of other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[39]	EDE-Q, QEWP-R, THEQ	BDI	■											BED: 152 women BN: 58 women PD: 24 women	cross-sectional	<ul style="list-style-type: none"> ■ BN and BED groups reported higher levels of depression than PD.
[40]	AUDADIS-5, PRISM-5		■	■	■	■	■	■	■					36309 US civilians (56.3% women) BED: 318 individuals BN: 92 individuals AN: 276 individuals No ED: 35709	cross-sectional	<ul style="list-style-type: none"> ■ 93.8% of respondents with BED met criteria for at least one additional lifetime psychiatric disorder. ■ The lifetime prevalence rates for all psychiatric disorders were substantially higher in the ED groups than the no-specific ED group. ■ The lifetime BED group met criteria for significantly greater number of lifetime psychiatric diagnoses than the lifetime AN group. ■ BED was significantly associated with any MD, MDD, persistent depression, any AD, all individual anxiety disorders (except for panic disorder), PTSD, AUD, any personality or conduct disorders, and all individual personality and conduct disorder.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[41]	SCID-IP, EDE, BDI, PANAS, EDE-Q	■	■											Three distinct clinical samples: (a) 118 women with AN (b) 133 women with BN (c) 50 obese men and women: 9 with current BED	3 studies longitudinal cohort, retrospective	<ul style="list-style-type: none"> ■ Moderate to strong concordance for the measures of negative affective states across all three studies. ■ Moderate to strong concordance was for the measures of BE and exercise frequency. ■ The strongest evidence of concordance across measurement approaches was found for purging behaviors.
[42]	EDDS, EDE-Q, BFI, PANAS				■									BED: 20 women, 10 men BN: 47 women, 7 men	cohort	<ul style="list-style-type: none"> ■ Analysis showed a two-way interaction between neuroticism and NA liability predicting BE fluctuations, indicating that higher NA liability was only related to larger fluctuations in the frequency of BE episodes when present in participants who showed high symptoms of neuroticism. ■ An interaction was detected between ED diagnosis and NA liability. This was accounted for by differences in average NA between the diagnoses.

Table 3 (continued)

Reference	BED diagnosis (and other eating behaviors/ ED)	other instruments	depression/ mood disorders	anxiety disorders	substance use disorders	personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD	Study sample(s)	Methodology	Key findings
[43]	SCID-I, BED-Q, MDI EDE-Q	■	■	■	■	■	■	■	■	■	■	■	BED: 85 women, 13 men	cross-sectional	<ul style="list-style-type: none"> ■ The prevalence of depression was 56% according to self-reported data (MDI), while 34.7% had a depression diagnosis. ■ Disease-specific QoL in BED was associated with depression 	
[44]	EDE, EDE-Q	SCID, BDI-II	■	■	■	■	■	■	■	■	■	■	BED: 87 women, 13 men	experimental, randomized-controlled trial	<ul style="list-style-type: none"> ■ 40.59% participants had lifetime MD. 5.94% – current MD, 7.92 – current specific phobia, 3.96% - lifetime alcohol abuse, and 2.97% – lifetime social phobia 	

ASRS Adult ADHD Self-Report [45], ADHD-RS ADHD Rating Scale-IV-Home Version [46], ASI Addiction Severity Index [47], AUDADIS-5 NIAAA alcohol use disorder and associated disabilities interview schedule-5 [48], BAI/Beck Anxiety Inventory [49], BDI/Beck Depression Inventory [50, 51], BDI-II Beck Depression Inventory - II [52], BFI/Big Five Personality Inventory [53], BITE Bulimic Investigatory Test Edinburgh [54], CES-D Centre for Epidemiologic Studies Depression Scale [55], CTQ Childhood Trauma Questionnaire [56, 57], DIFD-IV Diagnostic Interview for DSM-IV Personality Disorders [58], EAT-40 Eating Attitudes Test [59], EAT-26 Eating Attitudes Test [60], EDDS Eating Disorder Diagnostic Scale [61], EDE Eating Disorder Examination [62], EDE-Q Eating Disorder Examination Questionnaire [63], EDI-1 Eating Disorder Inventory-1 [64], EDI-2 Eating Disorder Inventory-2 [65], EES Emotional Eating Scale [66], FHRDCI Family History - Research Diagnostic Criteria interview [67], IDS Inventory for Depressive Symptomatology [68], LEO-CV Leyton Obsessional Inventory Child Version [69], MCMI-III Millon Clinical Multiaxial Inventory, Third Edition [70], MINI-Kid Mini International Neuropsychiatric Interview for Children and Adolescents [71], MMPI-2 Minnesota Multiphasic Personality Inventory-2 [72], NEO-PI-R NEO-PI-R PERSONALITY INVENTORY-REVISED [73], PAI Depression Scale Personality Assessment Inventory Depression Scale [74], PANAS Positive and Negative Affect Schedule [75], PRISM-5 Psychiatric Research Interview for Substance and Mental Disorders, DSM-5 version [76], QEWPP-R Questionnaire for Eating and Weight Patterns Revised [77], SCID-I Structured Clinical Interview for DSM-IV Axis I Disorder - Research version [78], SCID-I/P Structured Clinical Interview for DSM-IV Axis I Disorders-Patient Edition [79, 80], SCID-I/NP Structured Clinical Interview for DSM-IV Axis I Disorders-Non-Patient Edition [81], SCID-II Structured Clinical Interview for DSM-IV Axis II Personality Disorders Self-Report [82], SCL-90 The symptoms checklist-90 [83], SCL-90-R The symptoms checklist-90 Revised [84], TFEQ Three-Factor Eating Questionnaire [85], Hopkins Symptom Checklist-25 [86], WEH Weight and Eating History interview [87]

Table 4 Binge eating in clinical and community samples

Reference	instruments	mood disorders	depression/ anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population-based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[88]	SCID-P	■	■	■	■	■								CI	875 outpatients with BD (bipolar I or II)	cross-sectional	<ul style="list-style-type: none"> ■ 125 (14.3%) patients met DSM-IV criteria for at least one comorbid lifetime Axis I ED, with BED (n=77) being more common than BN (n=42) and AN (n=27). ■ There were no significant ED comorbidity differences between BD I and BD II patients. ■ Patients with BD, especially women, not infrequently have comorbid ED, and this comorbidity is associated with an earlier age of onset and more severe course of BD illness.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[89]	SCID, BIB-CQ, BIB-PQ, CIRS	■	■	■	■	■	■	■	■				CI	717 patients 76.3% had BD 9.5% had BED	cross-sectional	<ul style="list-style-type: none"> ■ BED was associated with a significantly elevated BMI. ■ Both BED and obesity were associated with greater psychiatric and general illness burden, but illness burden profiles differed. ■ After controlling for obesity, BED was associated with suicidality, psychosis, mood instability, AD comorbidity, and substance abuse comorbidity. ■ After controlling for obesity, BED was associated with suicidality, psychosis, mood instability, AD comorbidity, and substance abuse comorbidity. ■ After controlling for BED status, obesity was associated with greater general medical comorbidity, but lower substance abuse comorbidity. ■ BED was associated with suicidality, psychosis, mood instability, anxiety disorder comorbidity, and substance abuse comorbidity. 	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[90]	SCID, BIB-CQ, BIB-PQ, EDDS, CIRS	■	■	■	■	■	■	■	■	■	■	■	■	CI	1092 patients with BD (bipolar I or II disorder or schizoaffect- ive disorder, bipolar type -SAD, BT)	cross-sectional	<ul style="list-style-type: none"> ■ 27% of patients had a current DSM-5 ED; 12% had BED, 15% had BN, and 0.2% had AN. ■ Rates of DSM-5-defined BED and BN were higher than clinical diagnosis rates and rates of DSM-IV-defined BED and BN. ■ Compared with BD patients without an ED, BD patients with a DSM-5 ED were younger and more likely to be women; had an earlier age of onset of BP; had higher EDDS composite scores and higher degrees of suicidality, mood instability, and AD comorbidity; and had a higher mean BMI, higher rate of obesity, and higher CIRS total scores.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality disorders	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD of bodily distress	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[91]	EDDS, SCID, BIB-CQ, BIB-PQ	■	■	■	■	■	■	■	■	■	■	■	CI	1114 BD spectrum patients (diagnosis of bipolar I dis- order, bipolar II disorder, or schizoaffective disorder; bipolar type; no current sui- cidal ideation or psychosis) *No BE behavior (No ED=783, BED=0, BN=0, AN=2) *BE behavior (No ED=33, BED=131, BN=165, AN=0)	cross-sectional	<ul style="list-style-type: none"> ■ 30% of patients had any BE and 27% had BE plus ED diagnosis. ■ Compared with bipolar spectrum patients without BE, bipolar spectrum patients with BE were younger and more likely to be female; had significantly higher levels of eating psychopathology, suicidality, mood instability, and AD comorbidity; had a significantly higher mean BMI and a significantly higher rate of obesity; and had a significantly higher medical illness burden. ■ Bipolar spectrum patients with BE but no ED diagnosis was more similar to bipolar spectrum patients without BE than to those with an ED. Nonetheless, the positive predictive value and specificity of BE predicting an ED was 0.90 and 0.96, respectively.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[92]	<p>■</p> <p>MINI-Plus 5.0.0, HDRS-17, MADRS, YMRS, CGI-S, UKU,SEX FX, Klein Trauma and Abuse-Neglect Questionnaire, PDSQ, NEO-FFI, O-LES-Q, SDS, EWPS, TAQ, RSES, ASRS- v1.1, WURS-25, MDO</p>											■	CI	631 par- ticipants with MDD or BD *501 without BE *130 with BE	cross-sectional	<p>■ A higher percentage of individuals with BD met criteria for BE when compared to MDD.</p> <p>■ Individuals with a MD and BE had greater scores on measures of anxiety severity and higher rates of lifetime and current substance dependence, lifetime alcohol abuse, ADHD, and measures of neuroticism.</p> <p>■ BE is common among adults utilizing tertiary care services principally for a MD.</p> <p>■ The presence of BE identifies a subset of adults with mood disorders who have greater illness complexity as evidenced by course of illness variables and comorbidity.</p>	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[93]	SCID, Y-BOCS, DY-BOCS, OCD natural history questionnaire, BDI	■	■	■	■	■	■				■		CI	1001 patients with OCD	cross-sectional	<ul style="list-style-type: none"> ■ The following variables remained associated with social phobia (SP) comorbidity after logistic regression: male sex, lower socioeconomic status, BDD, specific phobia, dysthymia, GAD, agoraphobia, Tourette syndrome and BED. 	
[94]	SCID, Y-BOCS, DY-BOCS, OCD Natural History Questionnaire, BDI, BAI, USP-SPS	■	■	■	■	■					■	■	■	CI	*1001 with OCD as the main diagnosis (153 OCD+PD, 49 OCD+AG, 202 OCD +PD/ AG)	cross-sectional	<ul style="list-style-type: none"> ■ AG was correlated to dysthymia, BDHI, SP, impulsive-compulsive internet use, BN, and BED. ■ Patients with PD/AG were also more likely to be married and to present high anxiety, separation anxiety disorder, major depression, impulsive-compulsive internet use, generalized anxiety, post-traumatic stress, and BED. ■ Patients with OCD associated with AG exhibited greater rates of comorbid social phobia, impulsive-compulsive internet use, BN and BED.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD of bodily distress	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[95]	API, YFAS, BIS-11, EAT	■	■	■	■	■							CI	100 men with HUD (28 with food addiction, 78 without FA) 100 controls	cross-sectional	<ul style="list-style-type: none"> ■ BED was more prevalent in patients with HUD (21%) than in control subjects (8%). ■ 1.2% (n=31) of the sample had BE. ■ There was a significant association between ADHD and BE, BE partially mediates the association between ADHD and BMI z-scores.
[96]	SCID, C-BEDS	■										■	CI	252 patients (children)	cross-sectional	
[97]	PDSQ-ED, MINI, IDS-C, QIDS-C, CAST, CHRT, ASRM	■	■			■							CI	482 patients with MDD	experimental, single-blind placebo-controlled trial	<ul style="list-style-type: none"> ■ 95 patients experienced BE symptoms. ■ Patients with MDD experiencing BE symptoms were characterized by higher scores of negative self-outlook, negative outlook of future, irritability, comorbidity, anxiety disorders (generalized anxiety disorder, panic disorder, social phobia, OCD, hypomanic symptoms, and suicidality). ■ BE symptoms (OR = 2.02; 95% CI = 1.06-3.84) and depression severity (OR = 1.04; 95% CI = 1.00-1.08) were independently associated with lifetime attempted suicide.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[98]	CIDI	■	■	■	■	■	■							Pb	10123 adolescents aged 13 to 18 years	cross-sectional	<ul style="list-style-type: none"> ■ Lifetime prevalence estimates of BED and sBED (subclinical BED) were 1.6% and 2.5%. BED was more prevalent in girls. ■ The 12-month prevalence rates of BED and sBED were 0.9% and 1.1%. ■ 83.5% of BED participants and 70.1% of sBED participants met criteria for at least 1 other lifetime DSM-IV disorder. ■ BED was strongly associated with mood and anxiety disorder. 37% of adolescents with BED endorsed 3 or more classes of comorbid disorders. ■ BED was related to suicide attempts, substance abuse or dependence, and behavioral disorders.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[99]	DISC-2	■	■											Pb	833 adolescent girls (mean age = 15.7 ± 0.5 years)	cross-sectional	<ul style="list-style-type: none"> ■ The prevalence was 1.08% for girls suffering from sBED. ■ Girls with sBED had a 3.5-fold increase in the odds of suffering from MD diagnosis (95%CI=2.3-17.1, PE0.001). ■ 3.2-fold increase in the odds of suffering from DY diagnosis (95%CI=1.4-7.2, PE0.006), and 1.8-fold increase in the odds of suffering from anxiety symptoms of GA (95%CI=1.0-3.2, PE0.04).
[100]	SSAGA													Pb	3,226 European American (EA) and 550 African American (AA) young adult women (twins) from the Missouri Adolescent Female Twin Study.	cohort study	<ul style="list-style-type: none"> ■ Results suggest that common familial influences underlie MDD and OE-BE, and the magnitude of familial influences contributing to the comorbidity between MDD and OE-BE is similar between EA and AA women.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD disorders of bodily distress	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[101]	CIDI	■	■	■	■	■	■						Pb	10,123 adolescents and 2,980 adults	cross-sectional	<ul style="list-style-type: none"> ■ Among adults and adolescents, BED was associated with elevated odds of suicide ideation, plan, and attempt at a univariate level. ■ Most adolescents experienced suicidality onset following BED onset, whereas most adults experienced suicidality onset prior to BED onset. ■ The proportion of individuals with BED who had mood (adolescents only), anxiety (adults ages 30–44 years only), and behavioral disorders (adolescents and adults ages 30–44 years) was greater among those with versus without suicidality.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[102]	CIDI							■						Pb	2392 men, 3310 women	cross-sectional	<ul style="list-style-type: none"> ■ Most women and men with AN, BN, and BED reported a history of interpersonal trauma. ■ Rates of PTSD were significantly higher among women and men with BN and BED. ■ Subthreshold PTSD was more prevalent than threshold PTSD among women with BN and women and men with BED.
[103]		■	■	■										Pb	6140 participants at the age of 14 (55.5% females) 5069 participants at the age of 16 (58.7% females)	longitudinal, population-based, prospective cohort study	<ul style="list-style-type: none"> ■ All ED were predictive of later AD. ■ AN, BN, BED, PD, and OSFED were prospectively associated with depression (BED: OR = 2.00, 95% CI = 1.06-3.75). ■ All ED but AN predicted drug use and deliberate self-harm subthreshold (BED: OR = 2.32, 95% CI = 1.43-3.75). ■ Although BED and BN predicted obesity, AN was prospectively associated with underweight.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD of bodily distress	ADHD population- based (Pb)/ community (Ct)	Clinical (CI)/ Study sample(s)	Methodology	Key findings
[104]	SDQ, BET	■	■	■	■	■	■	■	■	■	■	■	Pb	2,672 adolescents, comprising 186 adolescents with ADHD (148 boys, 38 girls) and 2,486 adolescents without ADHD (1,186 boys, 1,300 girls)	cross-sectional (data from longitudinal study)	<ul style="list-style-type: none"> ■ Boys with ADHD appear to be at a greater risk of regular BE classified by DSM-5 criteria at 14–15 years of age. ■ Overall, the risk for ED symptoms and partial-syndrome diagnoses in adolescents with ADHD does not appear to be high at 14–15 years of age when using DSM-5 criteria with population-based sampling.
[105]		■	■	■	■	■	■	■	■	■	■	■	Pb	4719 participants aged 18–44 (52.1% females)	cross-sectional	<ul style="list-style-type: none"> ■ Lifetime ADHD was strongly and significantly associated with lifetime BN, BED, and any ED in unadjusted models, but not with AN or sub-threshold BED. ■ After adjusting for demographic variables and psychiatric comorbidities, all associations of lifetime ADHD with EDs were substantially attenuated, and only the association of ADHD with BN remained statistically significant. ■ Similar results were found using past-12-month diagnoses.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[106]	CIDI											■	Pb	9282 partici- pants	cross-sectional	■ In both sexes, those with lifetime and past 12-month BE and BED had sig- nificantly higher prevalence of ADHD than those without BE and BED, respectively. ■ Women with lifetime and past 12-month BN and lifetime AN also had sig- nificantly higher prevalence of ADHD compared with women without these diagnoses.	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[107]	EDE-Q, EDI-2, BDI	■	■	■			■							Pb	8,694 females	cross-sectional	<ul style="list-style-type: none"> ■ 1.33 females had BN, 185 had BED. ■ 366 females had PMDD, 3,489 had PMS. ■ Prevalence of PMDD and PMS were 17.4 and 55.4% among those with BN, 10.7 and 48.9% among those with BED and 3.4 and 59.1% among those with subthreshold BED. ■ After adjustment for age, race/ethnicity, income, education, body mass index, age at menarche, birth control use, and comorbid mental health conditions, PMDD was associated with seven times the odds of BN (OR 7.2, 95% CI 2.3, 22.4) and PMS with two times the odds of BN (OR 2.5, 95% CI 1.1, .57). Neither PMDD nor PMS were significantly associated with BED.

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[108]	K-SADS-PL	■	■	■	■	■	■	■	■	■	■	■	Pb	30,532 chil- dren and ado- lescents aged between 6 and 18 years	cross-sectional study	<ul style="list-style-type: none"> ■ 45.6% of participants diagnosed with feeding and eating disorders had no other psychiatric comorbidity, 27.7% had one other psychiatric comorbidity, 10.6% had two comorbidities and 16.1% had three or more psychiatric comorbidities. ■ Obsessive-compulsive disorder, agoraphobia, MD, SP, oppositional defiant disorder, GAD, ADHD, PD, and conduct disorder were significantly higher among children and adolescents with feeding and eating disorders (BED included) compared to their peers without feeding and eating disorders. 	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD of bodily distress	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[109]	SCOFF, CIS-R, AUDIT, SADOQ-C, TSQ, SFQ	■	■	■	■	■	■	■					Pb	*7001 partici- pants (3907 females, 3094 males)	cross-sectional	<ul style="list-style-type: none"> ■ Adults assigned to ED type classes are at increased risk for mental health comorbidities and poorer social functioning. ■ Binge eaters were at higher odds for having a panic disorder or phobia, GAD, or mixed anxiety-depressive disorder.
[110]	WMH-CIDI	■	■	■	■	■	■	■					Ct	2268 partici- pants (1234 in Mexico and 1034 in the US)	cross-sec- tional	<ul style="list-style-type: none"> ■ The lifetime prevalence of BED was 1.6% in Mexico and 2.2% among Mexican-Americans. ■ Compared with Mexicans in families with migrants, risk for BED was higher in US-born Mexican-Americans with two US-born parents (aHR = 2.58, 95% CI 1.12–5.93). This effect was attenuated by 24% (aHR = 1.97, 95% CI 0.84–4.62) with adjustment for prior-onset depressive or anxiety disorder. ■ Adjustment for prior-onset conduct disorder increased the magnitude of association (aHR = 2.75, 95% CI 1.22–6.20).

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[111]	SCID, CAPS	■		■				■						Ct	432 male and 67 female veterans (including 28 couples in which both partners were veterans) who screened posi- tive for trauma histories and/ or a probable DSM-IV PTSD diagnosis	cross-sectional	<ul style="list-style-type: none"> ■ Lifetime rates of BN and BED diagnoses were comparable to civilian populations, and a considerable range of lifetime and current BN and BED symptoms were identified. ■ PTSD and depression severity were most consistently associated with BN and BED symptom severity, with depression most strongly associated with EDs for women.
[112]	SCID-IV/P, CIS-R	■	■											Ct	14,088 adults 841 (6%) with BE	cross-sectional (part of cohort study)	<ul style="list-style-type: none"> ■ Those with depressive episodes had twice the prevalence of BE. ■ Those with anxiety disorders had a 77% higher prevalence of BE. ■ Those who reported MADD had a 42% higher prevalence of BE (mixed anxiety and depressive disorder).

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[113]	SCID-I	■											Ct	*Finnish women twins born 1975-1979, participated in five surveys from age 16 until their mid-thirties. At Wave 4 (mean age 24 years), the women (N= 2,825) underwent a 2-stage screening for eating disorders.	logitudinal cohort study	<ul style="list-style-type: none"> ■ 16 women who met DSM-5 criteria for BED were detected, yielding a lifetime prevalence of 0.7% (95% confidence interval [CI] 0.4–1.2%). ■ Of women with BED, only two had a history of other ED, but six had lifetime MDD. 	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[114]	SCID	■	■	■			■						Ct	Two studies of veterans and their inti- mate partners (453 men and 307 women)	cross-sectional	<ul style="list-style-type: none"> ■ 10 women (3.3%) and 15 men (3.3%) met lifetime criteria for BED. ■ For women, the strongest positive correlation has been found between BED and dysthymia, GAD, and panic disorder. ■ In men, GAD and agoraphobia were positively related to BED the most. ■ A model with AN, BN, and BED symptoms loading onto the distress subsfactor of the internalizing domain fit the data best in the full sample and the male and female subsamples. This model was statistically equivalent for men and women. ■ All three EDs (AN, BN, BED) loaded onto distress, indicating that these conditions overlap with psychopathology characterized by negative affect. 	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[115]	EDE-Q, ISU, K-10, SF-12	■	■	■									Ct	794 Australian women initially recruited for 9-year assessment, 357 who completed the follow-up survey at T2 were analyzed	cross-sectional & longitudinal	<ul style="list-style-type: none"> ■ Recurrent Binge Eating (RBE) and ISU comorbidity was 5.88% in this nonclinical sample and having one condition increased the likelihood of the other. The two conditions had a different trajectory over two years whereby ISU participants had significant risk of developing RBE in addition to or in place of their ISU but the reverse was not found for RBE participants. 	
[116]	ASRS, BES											■	Ct	277 college students (170 women 107 men)	cross-sectional study	<ul style="list-style-type: none"> ■ BED symptomatology was associated with increased ADHD symptomatology and a higher BMI among both men and women. ■ Between BED symptomatology and ADHD symptomatology and between BED symptomatology and BMI were found to be significant among both men and women. 	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	disorders of bodily distress	ADHD	Clinical (CI)/ population- based (Pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[117]	MINI, GAIN-SS	■	■	■	■	■	■	■	■	■			Ct	4,889 first- year college students	cross-sectional study	<ul style="list-style-type: none"> ■ BPB (especially binge eating) are relatively common and associated with mental health problems. ■ Binge eating only was significantly associated with 5 of 8 mental health problems with elevated odds for both internalizing (depression, anxiety, insomnia, posttraumatic stress, and suicidality) and externalizing emotional problems inattentiveness, hyperactivity, impulsivity, and conduct disorder, substance use and abuse, (problematic use, substance abuse, and dependence) and crime/violence-related problems (interpersonal, property, and drug-related crimes). 	

Table 4 (continued)

Reference	instruments	depression/ mood disorders	anxiety disorders	substance use disorders	Personality disorders	suicidality	behavioral disorder	PTSD, adjustment, acute stress	psychotic disorders	sleep disorders	impulse control disorder	ADHD of bodily distress	Clinical (CI)/ population- based (pb)/ community (Ct)	Study sample(s)	Methodology	Key findings
[118]	BES, TFEQ, YFAS, DASS-21	■	■										Ct	94 adults with disinhibited eating	community-based feasibility randomized controlled trial	■ 68 participants had a diagnosis of BED, 19 – BN, 39 – comorbid depressive symptoms, and 43 – comorbid anxiety

ASRS Adult ADHD Self-Report [145], API Addiction Profile Index [119], ASRM Altman Self-Rating Mania [120], AUDIT Alcohol Use Disorders Identification Test [121], BAI Beck Anxiety Inventory [49], BDI Beck Depression Inventory-II [50, 51], BES Binge Eating Scale [122], BET Branched Eating Disorders Test [123], BIB-CQ Bipolar Biobank Clinical Questionnaire [89], BIB-PQ Bipolar Patient Questionnaire [89], BIS-17 Barratt Impulsivity Scale-version 11 [124], BITE Bulimic Investigatory Test Edinburgh [54], CAST Concise Associated Symptoms Tracking [125], CAPS Clinician Administered PTSD Scale [126], C-BEDS Children's Binge Eating Disorder Scale [127], CGI-S Clinical Global Impressions-Severity of Illness scale [128], CHRT Concise Health Risk Tracking [125], CIRIS Modified Cumulative Illness Rating Scale [129], CIS-R Clinical Interview Schedule Revised [130], DASS-21 Depression anxiety and stress scale [131], DISC-2 Diagnostic Interview Schedule for Children-version 2 [132], DY-BOCS Dimensional Yale-Brown Obsessive-Compulsive Scale [133], EAT Eating Attitudes Test [59], EDDS Eating Disorder Diagnostic Scale [61], EDE-Q Eating Disorder Examination Questionnaire [63], EDI-2 Eating Disorder Inventory-2 [65], EWPS Endicott Work Productivity Scale [134], GAIW-SS Global Appraisal of Individual Needs Short Screener [135], HDRS Hamilton Depression Rating Scale-4 [136], IDS-C Inventory of Depressive Symptomatology-Clinician Rating [137], ISU Illicit Substance Use [138], K-10 Kessler-10 item distress scale [139], MADRS Montgomery-Asberg Depression Rating Scale [140], MDQ Mood Disorder Questionnaire [141], MINI/MINI International Neuropsychiatric Interview [142], NEO-FFI NEO-Five Factor Inventory [73], OCD Natural History Questionnaire (Leckman: Yale OCD Natural History Questionnaire, unpublished), PDSQ Psychiatric Diagnostic Screening Questionnaire [143], Q-LES-Q Quality of Life Enjoyment and Satisfaction Questionnaire [144], QIDS-C16 Quick Inventory of Depressive Symptomatology [145], RSES Rosenberg Self-Esteem Scale [146], SADOQ-C Severity of Alcohol Dependence Questionnaire [147], SCID-I/Structured Clinical Interview for DSM-IV Axis I Disorder - Research version [78], SCID-I/P Structured Clinical Interview for DSM-IV Axis I Disorders-Patient Edition [79, 80], SCOFF questionnaire [148], SDQ Strengths and Difficulties Questionnaire [149], SDS Sheehan Disability Scale [150], SEX FX Sex Effects Scale [151], SF-12 12-Item Short-Form Health Survey [152], SFQ Social Functioning Questionnaire [153], SSAGA Semi-Structured Assessment for the Genetics of Alcoholism [154], TAQ Trimodal Anxiety Questionnaire [155], TSO Trauma Screening Questionnaire [156], TFEQ Three-Factor Eating Questionnaire [85], UKU Udvalg for Kliniske Undersøgelser Side Effect Rating Scale [157], USP-SPS USP-Sensory Phenomena Scale [158], WMH-CIDI/World Mental Health Composite International Diagnostic Interview [159], WUURS-25 Wender Utah Rating Scale-Short Form [160], Y-BOCS Yale-Brown obsessive-compulsive scale [161, 162], YFAS Yale Food Addiction Scale [163], YMRS Young Mania Rating Scale [164]

disorder, ADHD, personality disorders, behavioral disorders, disorders of bodily distress, and schizophrenia. Furthermore, this study highlights that BED is associated with suicidality and sleep–wake disorders. Considering the abundance of articles demonstrating elevated co-occurrence rates of mood disorders, anxiety disorders, and substance use disorders among individuals with BED, the findings presented in this manuscript mark a crucial stride toward developing personalized treatment approaches. This objective can be achieved through the implementation of naturalistic study designs that incorporate the treatment of comorbidities, particularly given the evidence indicating that the co-occurrence of mood, anxiety, and/or substance use disorders is associated with a more severe course of BED.

Despite available data pointing to the co-occurrence of BED with psychotic disorders e.g., [28, 39, 91] and impulse control disorders e.g., [30, 93], these connections have received limited attention. A significant avenue for future research lies in exploring the comorbidity of BED with symptoms associated with compulsive sexual behavior disorder, a novel diagnostic entity recently included in the ICD-11 under impulse control disorders. Furthermore, although there is a scarcity of published research on the comorbidity of BED with behavioral disorders and disorders of bodily distress, existing data suggest associations with these psychiatric conditions.

Existing data suggest that BED is linked to an elevated psychiatric and general illness burden. The presence of binge eating behavior may contribute to increased illness complexity, impacting the course of illness and comorbidity, as evidenced in various studies e.g., [92]. Moreover, some studies indicate that individuals with BED are more prone to higher levels of suicidality, as well as substance abuse or dependence [89–91, 101].

Regarding treatment efficacy, a study conducted by Robinson and colleagues [36] demonstrated that dialectical behavior therapy (DBT) outperformed active comparison group therapy (ACGT) for individuals with BED who had comorbid avoidant personality disorders or an earlier onset of overweight and dieting (< 15 years old). In a study by Touchette and colleagues [99] involving patients undergoing cognitive behavioral therapy (CBT), it was found that the degree of social embedding and psychopathological comorbidity (both state and trait) served as predictors of treatment outcomes. Higher scores on depressive symptoms, agoraphobia, and extraversion were correlated with less improvement.

Overall, our findings endorse the general assumption of the relationship between BED and general psychopathology. It is crucial for mental health providers to recognize this association to effectively address the diagnostic and

therapeutic challenges associated with BED. As conceptualized in our study, impulsive overeating serves as one of the regulatory behaviors aimed at coping with negative emotions e.g., [15, 17, 91]. These traits are commonly associated with mood, anxiety, impulse control, attention deficit and hyperactivity, and personality disorders [13–44]. Hence, accurately diagnosing and addressing the underlying psychopathology may also prove beneficial in mitigating this compensatory behavior and alleviating its associated psychological and physical (including metabolic) consequences. A clinical implication from our review is the need to screen for other psychiatric conditions in patients with BED and to identify BED symptoms in those with disorders like personality disorders, ADHD, mood, anxiety, and impulse control disorders. This approach ensures a more accurate diagnosis and more effective treatment plans, improving overall patient outcomes as co-occurring conditions can impact the severity and treatment response of BED.

Limitations

Several limitations of this systematic review warrant brief acknowledgment. Firstly, our literature search was limited to articles published in English, potentially limiting the breadth of available results on the topic. This is particularly noteworthy given that the development of BED appears to be influenced by cultural and socioeconomic factors. Secondly, a significant challenge in comparing selected studies arises from the diverse methodologies employed. While the majority of the relevant studies are cross-sectional, there is a scarcity of data from longitudinal studies or experimental trials, both uncontrolled and randomized controlled. Thirdly, we did not conduct a risk of bias assessment for the included studies. As a result, the potential impact of bias in the included studies on our overall findings should be interpreted with caution. The last limitation of our systematic review is the selection of the temporal scope of the analyzed articles. Due to the inclusion of BED in the DSM-5, initially our analysis focused on studies published from 2013 onwards. However, considering the emergence of significant studies incorporating proposed criteria before BED's official inclusion in the classification, we decided to extend the temporal scope back to 2010. Ultimately, due to ongoing analysis and research efforts, we opted to further extend the temporal scope to 2023.

Conclusions

In conclusion, our systematic review affirms BED as the most prevalent ED, with mood and anxiety disorders being the most common co-occurring conditions. A diagnosis of BED is frequently found in individuals experiencing major depressive disorder, bipolar disorder, or

obsessive–compulsive disorder. The heightened presence of symptoms such as depression, anxiety, substance use, and suicide risk underscore the importance of considering these factors in the treatment of individuals diagnosed with BED. Conversely, patients, especially those presenting with mood, anxiety, or substance use disorders, should also be screened for BED. Further research is warranted to elucidate the connections between BED and psychotic disorders, as well as disorders of bodily distress.

Authors' contributions

EK contributed to the conceptualization, methodology, literature search, data curation, writing – original draft preparation, review and editing. MB contributed to the literature search, data curation, and original draft preparation. JE contributed to the review and editing. MLS contributed to conceptualization, methodology, review and editing, and manuscript supervision.

Funding

In the preparation of this manuscript, Ewelina Kowalewska, Magdalena Bzowska and Michal Lew-Starowicz were financially supported by the Centre of Medical Postgraduate Education (statutory funding, program no 501–1-065–38–23).

Availability of data and materials

The data analyzed in this study are available from the corresponding author with a reasonable request.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 25 March 2024 Accepted: 1 July 2024

Published online: 13 August 2024

References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013.
- World Health Organization. International statistical classification of diseases and related health problems. 11th ed. Geneva: World Health Organization; 2019.
- Myers LL, Wiman AM. Binge eating disorder: a review of a new DSM diagnosis. *Res Soc Work Pract*. 2014;24(1):86–95. <https://doi.org/10.1177/1049731513507755>.
- Kessler RC, Berglund PA, Chiu WT, Deitz AC, Hudson JI, Shahly V, et al. The prevalence and correlates of binge eating disorder in the World Health Organization World mental health surveys. *Biol Psychiatry*. 2013;73:904–14. <https://doi.org/10.1016/j.biopsych.2012.11.020>.
- Montano CB, Rasgon NL, Herman BK. Diagnosing binge eating disorder in a primary care setting. *Postgrad Med*. 2016;128(1):115–23. <https://doi.org/10.1080/00325481.2016.1115330>.
- Grilo CM, Juarascio A. Binge-eating disorder Interventions: review, current status, and implications. *Curr Obes Rep*. 2023;12(3):406–16. <https://doi.org/10.1007/s13679-023-00517-0>.
- Manfredi L, Accoto A, Couyoumdjian A, Conversi DA. Systematic review of genetic polymorphisms associated with binge eating disorder. *Nutrients*. 2021;13:848. <https://doi.org/10.3390/nu13030848>.
- Bulik CM, Coleman JRI, Hardaway JA, Breithaupt L, Watson HJ, Bryant CD, et al. Genetics and neurobiology of eating disorders. *Nat Neurosci*. 2022;25:543–54. <https://doi.org/10.1038/s41593-022-01071-z>.
- Giel KE, Bulik CM, Fernandez-Aranda F, Hay P, Keski-Rahkonen A, Schag K, et al. Binge eating disorder. *Nat Rev Dis Primers*. 2022;8(1):16. <https://doi.org/10.1038/s41572-022-00344-y>.
- Cheah SL, Jackson E, Touyz S, Hay P. Prevalence of eating disorder is lower in migrants than in the Australian-born population. *Eat Behav*. 2020;37:101370. <https://doi.org/10.1016/j.eatbeh.2020.101370>.
- Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;37:n71. <https://doi.org/10.1136/bmj.n71>.
- Higgins J, Thomas J, Chandler J, Cumpston M, Li T, Page M, et al. *Cochrane handbook for systematic reviews of interventions*. London, UK: Cochrane; 2021.
- Aragona M, Petta AM, Balbi A. Psychotic phenomena in binge eating disorder: an exploratory MMPI-2 study. *Arch Psychiatry Psychother*. 2015;17(2):13–20. <https://doi.org/10.12740/APP/43321>.
- Becker DF, Masheb RM, White MA, Grilo CM. Psychiatric, behavioral, and attitudinal correlates of avoidant and obsessive-compulsive personality pathology in patients with binge-eating disorder. *Compr Psychiatry*. 2010;51(5):531–7. <https://doi.org/10.1016/j.comppsy.2009.11.005>.
- Becker DF, Grilo CM. Comorbidity of mood and substance use disorders in patients with binge-eating disorder: associations with personality disorder and eating disorder pathology. *J Psychosom Res*. 2015;79(2):159–64. <https://doi.org/10.1016/j.jpsychores.2015.01.016>.
- Blomquist KK, Grilo CM. Family histories of anxiety in overweight men and women with binge eating disorder: a preliminary investigation. *Compr Psychiatry*. 2015;62:161–9. <https://doi.org/10.1016/j.comppsy.2015.07.007>.
- Courbasson CM, Nishikawa Y, Shapira LB. Mindfulness-action based cognitive behavioral therapy for concurrent binge eating disorder and substance use disorders. *Eat Disord*. 2011;19(1):17–33. <https://doi.org/10.1080/10640266.2011.533603>.
- Deumens RAE, Noorthoorn EO, Verbraak MJPM. Predictors for treatment outcome of binge eating with obesity: a naturalistic study. *Eat Disord*. 2012;20(4):276–87. <https://doi.org/10.1080/10640266.2012.689207>.
- Fischer S, Meyer AH, Dremmel D, Schlup B, Munsch S. Short-term cognitive-behavioral therapy for binge eating disorder: long-term efficacy and predictors of long-term treatment success. *Behav Res Ther*. 2014;58:36–42. <https://doi.org/10.1016/j.brat.2014.04.007>.
- Grenon R, Tasca GA, Cwinn E, Coyle D, Sumner A, Gick M, et al. Depressive symptoms are associated with medication use and lower health-related quality of life in overweight women with binge eating disorder. *Womens Health Issues*. 2010;20(6):435–40. <https://doi.org/10.1016/j.whi.2010.07.004>.
- Grilo CM, Masheb RM, White MA. Significance of overvaluation of shape/weight in binge-eating disorder: comparative study with overweight and bulimia nervosa. *Obesity (Silver Spring)*. 2010;18(3):499–504. <https://doi.org/10.1038/oby.2009.280>.
- Grilo CM, Ivezaj V, White MA. Evaluation of the DSM-5 severity indicator for binge eating disorder in a clinical sample. *Behav Res Ther*. 2015;71:110–4. <https://doi.org/10.1016/j.brat.2015.05.003>.
- Grilo CM, Ivezaj V, White MA. Evaluation of the DSM-5 severity indicator for binge eating disorder in a community sample. *Behav Res Ther*. 2015;66:72–6. <https://doi.org/10.1016/j.brat.2015.05.003>.
- Guerdjikova AI, McElroy SL, Winstanley EL, Nelson EB, Mori N, McCoy J, et al. Duloxetine in the treatment of binge eating disorder with depressive disorders: a placebo-controlled trial. *Int J Eat Disord*. 2012;45(2):281–9. <https://doi.org/10.1002/eat.20946>.
- Guerdjikova AI, O'Melia AM, Mori N, McCoy J, McElroy SL. Binge eating disorder in elderly individuals. *Int J Eat Disord*. 2012;45(7):905–8. <https://doi.org/10.1002/eat.22028>.
- Hazzard VM, Crosby RD, Crow SJ, Engel SG, Schaefer LM, Brewerton TD, et al. Treatment outcomes of psychotherapy for binge-eating disorder in a randomized controlled trial: Examining the roles of childhood abuse and post-traumatic stress disorder. *Eur Eat Disorders Rev*. 2021;29:611–21. <https://doi.org/10.1002/erv.2823>.

27. Hilbert A, Pike KM, Wilfley DE, Fairburn CG, Dohm FA, Striegel-Moore RH. Clarifying boundaries of binge eating disorder and psychiatric comorbidity: a latent structure analysis. *Behav Res Ther.* 2011;49(3):202–11. <https://doi.org/10.1016/j.brat.2010.12.003>.
28. Hübel C, Abdulkadir M, Herle M, Loos RJF, Breen G, Bulik CM, et al. One size does not fit all. Genomics differentiates among anorexia nervosa, bulimia nervosa, and binge-eating disorder. *Int J Eat Disord.* 2021;54(5):785–93. <https://doi.org/10.1002/eat.23481>.
29. Ivanova IV, Tasca GA, Hammond N, Balfour L, Ritchie K, Koszycki D, et al. Negative affect mediates the relationship between interpersonal problems and binge-eating disorder symptoms and psychopathology in a clinical sample: a test of the interpersonal model. *Eur Eat Disorders Rev.* 2015;23(2):133–8. <https://doi.org/10.1002/erv.2344>.
30. Keel PK, Holm-Denoma JM, Crosby RD. Clinical significance and distinctiveness of purging disorder and binge eating disorder. *Int J Eat Disord.* 2011;44(4):311–6. <https://doi.org/10.1002/eat.20821>.
31. Knoph BC, Torgersen L, Von Holle A, Hamer RM, Bulik CM, Reichborn-Kjennerud T. Factors associated with binge eating disorder in pregnancy. *Int J Eat Disord.* 2011;44(2):124–33. <https://doi.org/10.1002/eat.20797>.
32. Lammers MW, Vroliing MS, Ouwens MA, Engels RC, van Strien T. Predictors of outcome for cognitive behaviour therapy in binge eating disorder. *Eur Eat Disord Rev.* 2015;23(3):219–28. <https://doi.org/10.1002/erv.2356>.
33. Minnick AM, Cachelin FM, Durvasula RS. Personality disorders and psychological functioning among latina women with eating disorders. *Behav Med.* 2017;43(3):200–7. <https://doi.org/10.1080/08964289.2016.1276429>.
34. Núñez-Navarro A, Jiménez-Murcia S, Álvarez-Moya E, Villarejo C, Díaz IS, Augmantell CM, et al. Differentiating purging and nonpurging bulimia nervosa and binge eating disorder. *Int J Eat Disord.* 2011;44(6):488–96. <https://doi.org/10.1002/eat.20823>.
35. Pearl RL, White MA, Grilo CM. Weight bias internalization, depression, and self-reported health among overweight binge eating disorder patients. *Obesity (Silver Spring).* 2014;22(5):E142–8. <https://doi.org/10.1002/oby.20617>.
36. Robinson AH, Safer DL. Moderators of dialectical behavior therapy for binge eating disorder: results from a randomized controlled trial. *Int J Eat Disord.* 2012;45(4):597–602. <https://doi.org/10.1002/eat.20932>.
37. Ruiz-Ramos D, Martínez-Magaña JJ, García AR, Juárez-Rojop IE, González-Castro TB, Tovilla-Zarate CA, et al. Psychiatric comorbidity in mexican adolescents with a diagnosis of eating disorders its relationship with the body mass index. *Int J Environ Res Public Health.* 2021;18:3900. <https://doi.org/10.3390/ijerph18083900>.
38. Schreiber-Gregory DN, Lavender JM, Engel SG, Wonderlich SA, Crosby RD, Peterson CB, et al. Examining duration of binge eating episodes in binge eating disorder. *Int J Eat Disord.* 2013;46(8):810–4. <https://doi.org/10.1002/eat.22164>.
39. Roberto CA, Grilo CM, Masheb RM, White MA. Binge eating, purging, or both: eating disorder psychopathology findings from an internet community survey. *Int J Eat Disord.* 2010;43(8):724–31. <https://doi.org/10.1002/eat.20770>.
40. Udo T, Grilo CM. Psychiatric and medical correlates of DSM-5 eating disorders in a nationally representative sample of adults in the United States. *Int J Eat Disord.* 2019;52(1):42–50. <https://doi.org/10.1002/eat.23004>.
41. Wonderlich JA, Lavender JM, Wonderlich SA, Peterson CB, Crow SJ, Engel SG, et al. Examining convergence of retrospective and ecological momentary assessment measures of negative affect and eating disorder behaviors. *Int J Eat Disord.* 2015;48(3):305–11. <https://doi.org/10.1002/eat.22352>.
42. Zander ME, De Young KP. Individual differences in negative affect and weekly variability in binge eating frequency. *Int J Eat Disord.* 2014;47(3):296–301. <https://doi.org/10.1002/eat.22222>.
43. Gudmundsdóttir S, Linnert J, Lichtenstein MB, Adair CE, Carlsson SD, Brandt L, et al. Low quality of life in binge eating disorder compared to healthy controls. *Dan Med J.* 2023;70(4):A07220443.
44. Berking M, Eichler E, Naumann E, Svaldi J. The efficacy of a transdiagnostic emotion regulation skills training in the treatment of binge-eating disorder-results from a randomized controlled trial. *Br J Clin Psychol.* 2022;61(4):998–1018. <https://doi.org/10.1111/bjc.12371>.
45. Adler LA, Spencer T, Faraone SV, Kessler RC, Howes MJ, Biederman J, et al. Validity of pilot adult ADHD self-report scale (ASRS) to rate adult ADHD symptoms. *Ann Clin Psychiatry.* 2006;18:145–8. <https://doi.org/10.1080/10401230600801077>.
46. DuPaul GJ, Anastopoulos AD, Power TJ, Reid R, Ikeda MJ, McGoey KE. Parent rating of attention-deficit/hyperactivity disorder symptoms: factor structure and normative data. *J Psychopathol Behav Assess.* 1998;20:83–102. <https://doi.org/10.1037/pas0000166>.
47. McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grisson G, et al. The fifth edition of the addiction severity index: historical critique and normative data. *J Subst Abuse Treat.* 1992;9:199–213. [https://doi.org/10.1016/0740-5472\(92\)90062-5](https://doi.org/10.1016/0740-5472(92)90062-5).
48. Grant BF, Goldstein RB, Chou SP, Saha TD, Ruan WJ, Huang B, et al. The alcohol use disorder and associated disabilities interview schedule-diagnostic and statistical manual of mental disorders. 5th ed (AUDADIS-5). Rockville, MD: National Institute on Alcohol Abuse and Alcoholism; 2011.
49. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol.* 1988;56:893–7. <https://doi.org/10.1037/0022-006x.56.6.893>.
50. Beck AT, Steer R. Manual for revised beck depression inventory. New York: Psychological Corporation; 1987.
51. Beck AT, Steer R, Garbin MG. Psychometric properties of the beck depression inventory: 25 years of evaluation. *Clin Psychol Rev.* 1988;8:77–100. [https://doi.org/10.1016/0272-7358\(88\)90050-5](https://doi.org/10.1016/0272-7358(88)90050-5).
52. Beck AT, Steer RA, Brown GK. Manual for Beck Depression Inventory II (BDI-II). San Antonio, TX: Psychological Corporation; 1996.
53. John OP, Naumann LP, Soto CJ. Paradigm shift to the integrative big-five trait taxonomy: history, measurement, and conceptual issues. In: John OP, Robins RW, Pervin LA, editors. *Handbook of personality: theory and research.* New York, NY: Guilford Press; 2008. p. 114–58.
54. Henderson M, Freeman CP. A self-rating scale for bulimia. The 'BITE'. *Br J Psychiatry.* 1987;150:18–24. <https://doi.org/10.1192/bjp.150.1.18>.
55. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977;1:385–401. <https://doi.org/10.1177/014662167700100306>.
56. Bernstein DP, Fink L. Childhood trauma questionnaire. San Antonio, TX: Psychological Corporation; 1998.
57. Bernstein DP, Stein JA, Newcomb MD, Walker E, Pogge D, Ahluvalia T, et al. Development and validation of a brief screening version of the childhood trauma questionnaire. *Child Abuse Negl.* 2003;27(2):169–90. [https://doi.org/10.1016/S0145-2134\(02\)00541-0](https://doi.org/10.1016/S0145-2134(02)00541-0).
58. Zanarini MC, Frankenburg FR, Sickel AE, Young L. The diagnostic interview for DSM-IV personality disorders. Belmont: McLean Hospital; 1996.
59. Garner DM, Garfinkel PE. The eating attitudes test: an index of the symptoms of anorexia nervosa. *Psychol Med.* 1979;9:273–9. <https://doi.org/10.1017/s0033291700030762>.
60. Garner DM, Olmstead MP, Bohr Y, Garfinkel PE. The eating attitudes test: psychometric features and clinical correlates. *Psychol Med.* 1982;12:871–8. <https://doi.org/10.1017/s0033291700049163>.
61. Stice E, Telch CF, Rizvi SL. Development and validation of the eating disorder diagnostic scale: a brief self-report measure of anorexia, bulimia, and binge-eating disorder. *Psychol Assess.* 2000;12:123–31. <https://doi.org/10.1037/1040-3590.12.2.123>.
62. Fairburn CG, Cooper Z. The eating disorder examination (12th ed). In: Fairburn CG, Wilson GT, editors. *Binge eating: nature, assessment, and treatment.* New York: Guilford Press; 1993. p. 317–60.
63. Reas DL, Grilo CM, Masheb RM. Reliability of the eating disorder examination-questionnaire in patients with binge eating disorder. *Behav Res Ther.* 2006;44:43–51. <https://doi.org/10.1016/j.brat.2005.01.004>.
64. Garner DM, Olmstead MP, Polivy J. Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *Int J Eat Disord.* 1983;2:15–34. [https://doi.org/10.1002/1098-108X\(198321\)2:2%3c15::AID-EAT2260020203>3.0.CO;2-6](https://doi.org/10.1002/1098-108X(198321)2:2%3c15::AID-EAT2260020203>3.0.CO;2-6).
65. Garner DM. Eating disorder inventory-2; professional manual. Lutz, FL: Psychological Assessment Resources; 1991.
66. Arnow B, Kenardy J, Agras WS. The emotional eating scale: the development of a measure to assess coping with negative affect by eating. *Int J Eat Disord.* 1995;18:79–90. [https://doi.org/10.1002/1098-108x\(199507\)18:1%3c79::aid-eat2260180109>3.0.co;2-v](https://doi.org/10.1002/1098-108x(199507)18:1%3c79::aid-eat2260180109>3.0.co;2-v).

67. Andreasen NC, Endicott J, Spitzer RL, Winokur G. The family history method using diagnostic criteria. *Arch Gen Psychiatry*. 1977;34:1229–35. <https://doi.org/10.1001/archpsyc.1977.01770220111013>.
68. Rush AJ, Giles DE, Schlessler MA, Fulton CL, Weissenburger J, Burns C. The inventory for depressive symptomatology (IDS): preliminary findings. *Psychiatry Res*. 1986;18:65–87. [https://doi.org/10.1016/0165-1781\(86\)90060-0](https://doi.org/10.1016/0165-1781(86)90060-0).
69. Berg CZ, Whitaker A, Davies M, Flament MF, Rappaport JL. The survey form of the Leyton Obsessional Inventory-Child Version. *J Am Acad Child Adolesc Psychiatry*. 1988;759–763. <https://doi.org/10.1097/00004583-198811000-00017>.
70. Millon T, Millon C, Davis R, Grossman S. MCMI-III manual. 4th ed. Minneapolis, MN: Pearson Education; 2009.
71. Högberg C, Billstedt E, Björck C, Björck PO, Ehlers S, Gustle LH, et al. Diagnostic validity of the MINI-KID disorder classifications in specialized child and adolescent psychiatric outpatient clinics in Sweden. *BMC Psychiatry*. 2019;19:142. <https://doi.org/10.1186/s12888-019-2121-8>.
72. Hathaway SR, McKinley JC. MMPI-2, Minnesota multiphasic personality inventory-2 manuale. Firenze: O.S. Organizzazioni Speciali; 1989.
73. Costa PT Jr, McCrae RR. Revised NEO personality inventory (NEO-PI-R) and the five-factor inventory (NEO-FFI): professional manual. Odessa, FL: Psychological Assessment Resources; 1992.
74. Morey L. Personality assessment inventory professional manual. 2nd ed. Odessa, FL: Psychological Assessment Resources; 2007.
75. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: The PANAS scales. *J Personal Soc Psychol*. 1988;54:1063–70. <https://doi.org/10.1037/0022-3514.54.6.1063>.
76. Hasin DS, Shmulewitz D, Stohl M, Greenstein E, Aivadyan C, Morita K, et al. Procedural validity of the AUDADIS-5 depression, anxiety and post-traumatic stress disorder modules: substance abusers and others in the general population. *Drug Alcohol Depend*. 2015;152:246–56. <https://doi.org/10.1016/j.drugalcdep.2015.03.027>.
77. Yanovski S. Binge eating disorder: current knowledge and future directions. *Obesity Research*. 1993;1:306e324. <https://doi.org/10.1002/j.1550-8528.1993.tb00626.x>.
78. First M, Gibbon M, Spitzer R, Williams J. Users guide for the structured clinical interview for DSM IV axis I disorders— research version (SCID-I, version 2.0). New York: New York State Psychiatric Institute; 1996.
79. First MB, Spitzer RL, Gibbon M, Williams JBW. Structured clinical interview for DSM-IV axis I Disorders (SCID-IP). Washington, DC: American Psychiatry Press; 1995.
80. First M, Spitzer RL, Gibbon M, Williams, JBW, Benjamin LS. Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition (SCID-I/P). New York: Biometrics Research Department, New York State Psychiatric Institute; 2002.
81. First MB, Spitzer RL, Gibbon M, Williams JBW. Structured clinical interview for DSM-IV axis I disorders-non-patient edition (SCID-I/NP, version 2.0, 4/97 revisions). New York: Biometrics Research Department; 1997.
82. First MB, Gibbon M, Spitzer RL, Williams JBW, Benjamin LS. Structured clinical interview for DSM-IV axis II personality disorders self-report. Washington, DC: American Psychiatric Association; 1997.
83. Arrindell WA, Ettema JHM. SCL-90, checklist for multidimensional psychopathology. Lisse, Netherlands: Swets & Zeitlinger B.V; 1986.
84. Derogatis L. SCL-90-R. A bibliography of research reports 1975–1990. Baltimore, MD: Clinical Psychometric Research; 1990.
85. Stunkard AJ, Messick S. The three-factor eating questionnaire to measure dietary restraint, disinhibition, and hunger. *J Psychosom Res*. 1985;29:71–81. [https://doi.org/10.1016/0022-3999\(85\)90010-8](https://doi.org/10.1016/0022-3999(85)90010-8).
86. Strand BH, Dalgard OS, Tambis K, Rognerud M. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nord J Psychiatry*. 2003;57:113–8. <https://doi.org/10.1080/08039480310000932>.
87. Reas DL, Grilo CM. Timing and sequence of the onset of overweight, dieting, and binge eating in overweight patients with binge eating disorder. *Int J Eat Disord*. 2007;40:165–70. <https://doi.org/10.1002/eat.20353>.
88. McElroy SL, Frye MA, Helleman G, Altshuler L, Leverich GS, Suppes T, et al. Prevalence and correlates of eating disorders in 875 patients with bipolar disorder. *J Affect Disord*. 2011;128(3):191–8. <https://doi.org/10.1016/j.jad.2010.06.037>.
89. McElroy SL, Crow S, Biernacka JM, Winham S, Geske J, Cuellar Barboza AB, et al. Clinical phenotype of bipolar disorder with comorbid binge eating disorder. *J Affect Disord*. 2013;150(3):981–6. <https://doi.org/10.1016/j.jad.2013.05.024>.
90. McElroy SL, Crow S, Blom TJ, et al. Prevalence and correlates of DSM-5 eating disorders in patients with bipolar disorder. *J Affect Disord*. 2016;191:216–21. <https://doi.org/10.1016/j.jad.2015.11.010>.
91. McElroy SL, Crow S, Blom TJ, et al. Clinical features of bipolar spectrum with binge eating behaviour. *J Affect Disord*. 2016;201:95–8. <https://doi.org/10.1016/j.jad.2016.05.003>.
92. Woldeyohannes HO, Soczynska JK, Maruschak NA, et al. Binge eating in adults with mood disorders: results from the international mood disorders collaborative project. *Obes Res Clin Pract*. 2015;10(5):531–43. <https://doi.org/10.1016/j.orcp.2015.10.002>.
93. Assunção MC, Costa DL, de Mathis MA, Shavitt RG, Ferrão YA, do Rosário MC, et al. Social phobia in obsessive-compulsive disorder: prevalence and correlates. *J Affect Disord*. 2012;143(1–3):138–47. <https://doi.org/10.1016/j.jad.2012.05.044>.
94. Torres AR, Ferrão YA, Shavitt RG, Diniz JB, Costa DL, do Rosário MC, et al. Panic disorder and agoraphobia in OCD patients: clinical profile and possible treatment implications. *Compr Psychiatry*. 2014;55(3):588–97. <https://doi.org/10.1016/j.comppsych.2013.11.017>.
95. Canan F, Karaca S, Sogucak S, Gecici O, Kuloglu M. Eating disorders and food addiction in men with heroin use disorder: a controlled study. *Eat Weight Disord*. 2017;22(2):249–57. <https://doi.org/10.1007/s40519-017-0378-9>.
96. Reinblatt SP, Leoutsakos JM, Mahone EM, Forrester S, Wilcox HC, Riddle MA. Association between binge eating and attention-deficit/hyperactivity disorder in two pediatric community mental health clinics. *Int J Eat Disord*. 2015;48(5):505–11. <https://doi.org/10.1002/eat.22342>.
97. Olgıati P, Fanelli G, Atti AR, De Ronchi D, Serretti A. Clinical correlates and prognostic impact of binge-eating symptoms in major depressive disorder. *Int Clin Psychopharmacol*. 2022;37(6):247–54. <https://doi.org/10.1097/YIC.0000000000000422>.
98. Swanson SA, Crow SJ, Le Grange D, Swendsen J, Merikangas KR. Prevalence and correlates of eating disorders in adolescent. Results from the national comorbidity survey replication adolescent supplement. *Arch Gen Psychiatry*. 2011;68(7):714–23. <https://doi.org/10.1001/archgenpsychiatry.2011.22>.
99. Touchette E, Henegar A, Godart NT, Pryor L, Falissard B, Tremblay RE, et al. Subclinical eating disorders and their comorbidity with mood and anxiety disorders in adolescent girls. *Psychosom Res*. 2011;185(1–2):185–92. <https://doi.org/10.1016/j.psychres.2010.04.005>.
100. Munn-Chernoff MA, Grant JD, Agrawal A, Koren R, Glowinski AL, Buchholz KK, et al. Are there common familial influences for major depressive disorder and an overeating-binge eating dimension in both European American and African American female twins?. *Int J Eat Disord*. 2015;48(4):375–82. <https://doi.org/10.1002/eat.22280>.
101. Forrest LN, Zuromski KL, Dodd DR, Smith AR. Suicidality in adolescents and adults with binge-eating disorder: results from the national comorbidity survey replication and adolescent supplement. *Int J Eat Disord*. 2017;50(1):40–9. <https://doi.org/10.1002/eat.22582>.
102. Mitchell KS, Mazzeo SE, Schlessinger MR, Brewerton TD, Smith BN. Comorbidity of partial and subthreshold ptsd among men and women with eating disorders in the national comorbidity survey-replication study. *Int J Eat Disord*. 2012;45(3):307–15. <https://doi.org/10.1002/eat.20965>.
103. Micali N, Solmi F, Horton NJ, Crosby RD, Eddy KT, Calzo JP, et al. Adolescent eating disorders predict psychiatric, high-risk behaviors and weight outcomes in young adulthood. *J Am Acad Child Adolesc Psychiatry*. 2015;54(8):652–9. <https://doi.org/10.1016/j.jaac.2015.05.009>.
104. Bisset M, Rinehart N, Sciberras E. DSM-5 eating disorder symptoms in adolescents with and without attention-deficit/hyperactivity disorder: a population-based study. *Int J Eat Disord*. 2019;52(7):855–62. <https://doi.org/10.1002/eat.23080>.
105. Ziobrowski H, Brewerton TD, Duncan AE. Associations between ADHD and eating disorders in relation to comorbid psychiatric disorders in a nationally representative sample. *Psychiatry Res*. 2018;260:53–9. <https://doi.org/10.1016/j.psychres.2017.11.026>.

106. Brewerton TD, Duncan AE. Associations between attention deficit hyperactivity disorder and eating disorders by gender: results from the National Comorbidity Survey replication. *Eur Eat Disord Rev*. 2016;24(6):536–40. <https://doi.org/10.1002/erv.2468>.
107. Nobles CJ, Thomas JJ, Valentine SE, Gerber MW, Vaewson AS, Marques L. Association of premenstrual syndrome and premenstrual dysphoric disorder with bulimia nervosa and binge-eating disorder in a nationally representative epidemiological sample. *Int J Eat Disord*. 2016;49(7):641–50. <https://doi.org/10.1002/eat.22539>.
108. Mohammadi MR, Mostafavi SA, Hooshyari Z, Khaleghi A, Ahmadi N, Molavi P, et al. Prevalence, correlates, and comorbidities of feeding and eating disorders in a nationally representative sample of Iranian children and adolescents. *Int J Eat Disord*. 2020;53(3):349–61. <https://doi.org/10.1002/eat.23197>.
109. McBride O, McManus S, Thompson J, Palmer RL, Brugha T. Profiling disordered eating patterns and body mass index (BMI) in the English general population. *Soc Psychiatry Psychiatr Epidemiol*. 2013;48(5):783–93. <https://doi.org/10.1007/s00127-012-0613-7>.
110. Swanson SA, Saito N, Borges G, Benjet C, Aguilar-Gaxiola S, Medina-Mora ME, et al. Change in binge eating and binge eating disorder associated with migration from Mexico to the US. *J Psychiatr Res*. 2012;46(1):31–7. <https://doi.org/10.1016/j.jpsychires.2011.10.008>.
111. Litwack SD, Mitchell KS, Sloan DM, Reardon AF, Miller MW. Eating disorder symptoms and comorbid psychopathology among male and female veterans. *Gen Hosp Psychiatry*. 2014;36(4):406–10. <https://doi.org/10.1016/j.genhosppsych.2014.03.013>.
112. Pinheiro AP, Nunes MA, Barbieri NB, et al. Association of binge eating behavior and psychiatric comorbidity in ELSA-Brasil study: results from baseline data. *Eat Behav*. 2016;23:145–9. <https://doi.org/10.1016/j.eatbeh.2016.08.011>.
113. Mustelin L, Raevuori A, Hoek HW, Kaprio J, Keski-Rahkonen A. Incidence and weight trajectories of binge eating disorder among young women in the community. *Int J Eat Disord*. 2015;48(8):1106–12. <https://doi.org/10.1002/eat.22409>.
114. Mitchell KS, Wolf EJ, Reardon AF, Miller MW. Association of eating disorder symptoms with internalizing and externalizing dimensions of psychopathology among men and women. *Int J Eat Disord*. 2014;47(8):860–9. <https://doi.org/10.1002/eat.22300>.
115. Lu HK, Mannan H, Hay P. Exploring relationships between recurrent binge eating and illicit substance use in a non-clinical sample of women over two years. *Behav Sci*. 2017;7(3):46. <https://doi.org/10.3390/bs7030046>.
116. Hanson JA, Phillips LN, Hughes SM, Corson K. Attention-deficit hyperactivity disorder symptomatology, binge eating disorder symptomatology, and body mass index among college students. *J Am Coll Health*. 2020;68(5):543–9. <https://doi.org/10.1080/07448481.2019.1583651>.
117. Serra R, Kiekens G, Vanderlinden J, et al. Binge eating and purging in first-year college students: prevalence, psychiatric comorbidity, and academic performance. *Int J Eat Disord*. 2019;1–10. <https://doi.org/10.1002/eat.23211>.
118. Cardi V, Meregalli V, Di Rosa E, Derrigo R, Faustini C, Keeler JL, et al. A community-based feasibility randomized controlled study to test food-specific inhibitory control training in people with disinhibited eating during COVID-19 in Italy. *Eat Weight Disord*. 2022;27(7):2745–57. <https://doi.org/10.1007/s40519-022-01411-9>.
119. Ogel K, Evren C, Karadag F, Gurol DT. The development, validity, and reliability of the Addiction Profile Index (API). *Turk Psikiyat Derg*. 2012;23(4):263–75.
120. Altman E. Rating scales for mania: is self-rating reliable?. *J Affect Disord*. 1998;50:283–6. [https://doi.org/10.1016/s0165-0327\(98\)00018-4](https://doi.org/10.1016/s0165-0327(98)00018-4).
121. Saunders JB, Aasland OG, Babor TF, Fuente JR, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption II. *Addiction*. 1993;88:791–804. <https://doi.org/10.1111/j.1360-0443.1993.tb02093.x>.
122. Gormally J, Black S, Daston S, Rardin D. The assessment of binge eating severity among obese persons. *Addict Behav*. 1982;7(1):47–55. [https://doi.org/10.1016/0306-4603\(82\)90024-7](https://doi.org/10.1016/0306-4603(82)90024-7).
123. Selzer R, Hamill C, Bowes G, Patton G. The branched eating disorders test: validity in a nonclinical population. *Int J Eat Disord*. 1996;20(1):57–64. [https://doi.org/10.1002/\(SICI\)1098-108X\(199607\)20:1%3c57::AID-EAT7>3.0.CO;2-3](https://doi.org/10.1002/(SICI)1098-108X(199607)20:1%3c57::AID-EAT7>3.0.CO;2-3).
124. Patton J, Stanford M, Barratt E. Factor structure of the Barratt Impulsiveness Scale. *J Clin Psychol*. 1995;51:151–84. [https://doi.org/10.1002/10974679\(199511\)51:6%3c768::AID-JCLP2270510607>3.0.CO;2-1](https://doi.org/10.1002/10974679(199511)51:6%3c768::AID-JCLP2270510607>3.0.CO;2-1).
125. Trivedi MH, Wisniewski SR, Morris DW, Fava M, Kurian BT, Gollan JK, et al. Concise associated symptoms tracking scale: a brief self-report and clinician rating of symptoms associated with suicidality. *J Clin Psychiatry*. 2011;72:765–74. <https://doi.org/10.4088/JCP11m06840>.
126. Weathers FW, Litz BT. Psychometric properties of the clinician administered PTSD scale. *PTSD Res Q*. 1994;5:2–6. <https://doi.org/10.1037/pas0000486>.
127. Shapiro JR, Woolson SL, Hamer RM, Kalarichian MA, Marcus MD, Bulik CM. Evaluating binge eating disorder in children: development of the children's binge eating disorder scale (C-BEDS). *Int J Eat Disord*. 2007;40:82–9. <https://doi.org/10.1002/eat.20318>.
128. Busner J, Targum SD. The clinical global impressions scale: applying a research tool in clinical practice. *Psychiatry (Edgmont)*. 2007;4(7):28–37.
129. Hudon C, Fortin M, Vanasse A. Cumulative illness rating scale was a reliable and valid index in a family practice context. *J Clin Epidemiol*. 2005;58:603–8. <https://doi.org/10.1016/j.jclinepi.2004.10.017>.
130. Lewis G, Pelosi AJ, Araya R, Dunn G. Measuring psychiatric disorder in the community: a standardized assessment for use by lay interviewers. *Psychol Med*. 1992;22:465–86. <https://doi.org/10.1017/s0033291700030415>.
131. Henry JD, Crawford JR. The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *Br J Clin Psychol*. 2005;44:227–39. <https://doi.org/10.1348/014466505X29657>.
132. Shaffer D, Fisher P, Dulcan MK, Davies M, Piacentini J, Schwab-Stone ME, et al. The NIMH Diagnostic Interview Schedule for Children version 2.3 (DISC-2.3): description, acceptability, prevalence rates, and performance in the MECA study. Methods for the epidemiology of child and adolescent mental disorders study. *J Am Acad Child Adolesc Psychiatry*. 1996;35:865–77. <https://doi.org/10.1097/00004583-199607000-00012>.
133. Rosario-Campos MC, Miguel EC, Quatran S, Chacon P, Ferrao Y, Findley D, et al. The Dimensional Yale-Brown Obsessive–Compulsive Scale (DY-BOCS): an instrument for assessing obsessive–compulsive symptom dimensions. *Mol Psychiatry*. 2006;11:495–504. <https://doi.org/10.1038/sj.mp.4001798>.
134. Endicott J, Nee J. Endicott Work Productivity Scale (EWPS): a new measure to assess treatment effects. *Psychopharmacol Bull*. 1997;33(1):13–6.
135. Dennis ML, Chan YF, Funk RR. Development and validation of the GAIN short screener (GSS) for internalizing, externalizing and substance use disorders and crime/violence problems among adolescents and adults. *Am J Addict*. 2006;15(1):80–91. <https://doi.org/10.1080/10550490601006055>.
136. Hamilton M. A rating scale for depression. *J Neurol Neurosurg Psychiatry*. 1960;23:56–62. <https://doi.org/10.1136/jnnp.23.1.56>.
137. Corruble E, Legrand JM, Duret C, Charles G, Guelfi JD. IDS-C and IDS-sr: psychometric properties in depressed in-patients. *J Affect Disord*. 1999;56:95–101. [https://doi.org/10.1016/s0165-0327\(99\)00055-5](https://doi.org/10.1016/s0165-0327(99)00055-5).
138. Gregorowski C, Seedat S, Jordaan GP. A clinical approach to the assessment and management of co-morbid eating disorders and substance use disorders. *BMC Psychiatry*. 2013;13:289. <https://doi.org/10.1186/1471-244X-13-289>.
139. Andrews G, Slade T. Interpreting scores on the Kessler psychological distress scale (K10). *Aust N Z J Public Health*. 2001;25:494–7. <https://doi.org/10.1111/j.1467-842x.2001.tb00310.x>.
140. Montgomery SA. A new depression scale designed to be sensitive to change. *Br J Psychiatry*. 1979;134:382. <https://doi.org/10.1192/bjp.134.4.382>.
141. Hirschfeld R, Williams J, Spitzer RL, et al. Development and validation of a screening instrument for bipolar spectrum disorder: the mood disorder questionnaire. *Am J Psychiatry*. 2000;157:1873–5. <https://doi.org/10.1176/appi.ajp.157.11.1873>.
142. Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, et al. The mini-international neuropsychiatric interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry*. 1998;59(Suppl 20):22–33 quiz 34.
143. Zimmerman M, Mattia JI. The reliability and validity of a screening questionnaire for 13 DSM-IV Axis I disorders (the psychiatric diagnostic screening questionnaire) in psychiatric outpatients. *J Clin Psychiatry*. 1999;60:677–83. <https://doi.org/10.4088/jcp.v60n1006>.

144. Endicott J, Nee J, Harrison W, Blumenthal R. Quality of life enjoyment and satisfaction questionnaire: a new measure. *Psychopharmacol Bull.* 1993;29(2):321–6 PMID: 8290681.
145. Rush AJ, Trivedi MH, Ibrahim HM, Carmody TJ, Arnow B, Klein DN, et al. The 16-item quick inventory of depressive symptomatology (QIDS), clinician rating (QIDS-C), and self-report (QIDS-SR): a psychometric evaluation in patients with chronic major depression. *Biol Psychiatry.* 2003;54:573–83. [https://doi.org/10.1016/s0006-3223\(02\)01866-8](https://doi.org/10.1016/s0006-3223(02)01866-8).
146. Rosenberg M. *Conceiving the Self*. New York: Basic Books; 1979.
147. Stockwell T, Sitharthan T, McGrath D, Lang E. The measurement of alcohol dependence and impaired control in community samples. *Addiction.* 1994;89:167–74. <https://doi.org/10.1111/j.1360-0443.1994.tb00875.x>.
148. Morgan J, Reid F, Lacey J. The SCOFF questionnaire: assessment of a new screening tool for eating disorders. *BMJ.* 1999;319:1467. <https://doi.org/10.1136/bmj.319.7223.1467>.
149. Goodman R. Psychometric properties of the strengths and difficulties questionnaire. *J Am Acad Child Adolesc Psychiatry.* 2001;40(11):1337–45. <https://doi.org/10.1097/00004583-200111000-00015>.
150. Sheehan DV. *The anxiety disease*. New York, NY, USA: Charles Scribners Sons; 1983.
151. Kennedy SH, Rizvi SJ, Fulton K, Ellis J, Quilty LC, Ravindran L. The sex effects scale: pilot validation in a healthy population. *Psychopharmacol Bull.* 2010;43(3):15–25.
152. Ware J Jr, Kosinski M, Keller SD. A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care.* 1996;34:220–33. <https://doi.org/10.1097/00005650-199603000-00003>.
153. Tyrer P, Nur U, Crawford M, Karlsen S, MacLean C, Rao B, Johnson T. The social functioning questionnaire: a rapid and robust measure of perceived functioning. *Int J Soc Psychiatry.* 2005;51:265.
154. Bucholz KK, Cadoret R, Cloninger CR, Dinwiddie SH, Hesselbrock VM, Nurnberger Jr, et al. A new, semistructured psychiatric interview for use in genetic-linkage studies: a report on the reliability of the SSAGA. *J Stud Alcohol.* 1994;55:149–58. <https://doi.org/10.15288/jsa.1994.55.149>.
155. Mărginean I, Filimon L. The Trimodal Anxiety Questionnaire (Taq): a validation study on communities from western Romania. *J Psychol Educ Res.* 2012;20(2):79–93.
156. Brewin CR, Rose S, Andrews B, Green J, Tata P, McEvedy C, et al. Brief screening instrument for posttraumatic stress disorder. *Br J Psychiatry.* 2002;181:158–62. <https://doi.org/10.1017/s0007125000161896>.
157. Chen KP, Lung FW. Reliability and validity of the short version of Udvalg for Kliniske Undersøgelser in antipsychotic treatment. *Psychiatr Q.* 2017;88(4):787–96. <https://doi.org/10.1007/s11126-017-9494-y>.
158. Rosario MC, Prado HS, Borcato S, Diniz JB, Shavitt RG, Hounie AG, et al. Validation of the University of São Paulo Sensory Phenomena Scale: initial psychometric properties. *CNS Spectr.* 2009;14:315–23. <https://doi.org/10.1017/s1092852900020319>.
159. Kessler RC, Ustun TB. The World Mental Health (WMH) survey initiative version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). *Int J Methods Psychiatr Res.* 2004;13:93–121. <https://doi.org/10.1002/mpr.168>.
160. Ward MF, Wender PH, Reimherr FW. The wender Utah rating scale: an aid in the retrospective diagnosis of childhood attention deficit hyperactivity disorder. *Am J Psychiatry.* 1993;150(6):885–90. <https://doi.org/10.1176/ajp.150.6.885>.
161. Goodman WK, Price LH, Rasmussen SA, Mazure C, Delgado P, Heninger GR, et al. The yale–brown obsessive-compulsive scale. II validity *Arch Gen Psychiatry.* 1989;46:1012–6. <https://doi.org/10.1001/archpsyc.1989.01810110054008>.
162. Goodman WK, Price LH, Rasmussen SA, Mazure C, Fleischmann RL, Hill CL, et al. The yale–brown obsessive-compulsive scale. I. development, use, and reliability. *Arch Gen Psychiatry.* 1989;46:1006–11. <https://doi.org/10.1001/archpsyc.1989.01810110048007>.
163. Gearhardt AN, Corbin WR, Brownell KD. Preliminary validation of the Yale Food Addiction Scale. *Appetite.* 2009;52:430–6. <https://doi.org/10.1016/j.appet.2008.12.003>.
164. Young RC, Biggs JT, Ziegler VE, Meyer DA. A rating scale for mania: reliability, validity and sensitivity. *Br J Psychiatry.* 1978;133:429–35. <https://doi.org/10.1192/bjp.133.5.429>.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.