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## Psychological Treatments for Binge Eating Disorder

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### Abstract

Binge eating disorder (BED) is the most prevalent eating disorder in adults, and individuals with BED report greater general and specific psychopathology than non-eating disordered individuals. The current paper reviews research on psychological treatments for BED, including the rationale and empirical support for cognitive behavioral therapy (CBT), interpersonal psychotherapy (IPT), dialectical behavior therapy (DBT), behavioral weight loss (BWL), and other treatments warranting further study. Research supports the effectiveness of CBT and IPT for the treatment of BED, particularly for those with higher eating disorder and general psychopathology. Guided self-help CBT has shown efficacy for BED without additional pathology. DBT has shown some promise as a treatment for BED, but requires further study to determine its long-term efficacy. Predictors and moderators of treatment response, such as weight and shape concerns, are highlighted and a stepped-care model proposed. Future directions include expanding the adoption of efficacious treatments in clinical practice, testing adapted treatments in diverse samples (e.g., minorities and youth), improving treatment outcomes for nonresponders, and developing efficient and cost-effective stepped-care models.

### Keywords

Binge eating disorder; Eating disorders; Loss of control; Psychological treatments; Treatment review; Randomized controlled trials; Cognitive behavioral therapy; Guided self-help; Interpersonal psychotherapy; Behavioral weight loss; Dialectical behavior therapy

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## Introduction

Binge eating disorder (BED) is characterized by recurrent binge eating (i.e., eating an unusually large amount of food accompanied by a sense of loss of control) in the absence of significant compensatory behaviors (e.g., self-induced vomiting, excessive exercise). BED affects 3.5% of women and 2.0% of men in the USA [1], and is similarly prevalent across racial/ethnic groups [2–4]. Although children and adolescents are less likely than adults to meet the criteria for BED, related behaviors such as loss of control eating (i.e., the experience of loss of control over eating regardless of the amount of food consumed) are prevalent [5–7].

Binge eating disorder is associated with significant morbidity, including medical complications related to obesity (e.g., type 2 diabetes, cardiovascular disease), eating disorder psychopathology (e.g., weight and shape concerns), psychiatric co-morbidity, reduced quality of life, and impaired social functioning [8]. The clinical significance of BED has been well established [9, 10], and its diagnosis has been suggested for inclusion in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) ([www.dsm5.org](http://www.dsm5.org)).

Although BED is associated with significant impairment, prognosis is good with appropriate therapeutic intervention. Treatments for BED target binge eating, associated eating disorder psychopathology, and the prevention of excess weight gain or modest weight loss. The present paper will review randomized controlled trials (RCTs) of psychological treatments for BED in order to inform current clinical practice and future research. The rationale and empirical evidence for cognitive behavioral therapy (CBT), interpersonal psychotherapy (IPT), behavioral weight loss treatment (BWL), and dialectical behavior therapy (DBT), as well as promising alternative treatments, will be presented (see Table 1). Predictors and moderators of treatment outcome, which may aid in developing and delivering more effective and efficient treatments, will also be reviewed.

While pharmacological treatments for BED have received much attention in recent years [11], the current review focuses on RCTs of psychological treatments delivered alone or in combination with pharmacotherapy (see Table 2), given evidence that pharmacological treatments are not as efficacious as psychological treatments [12]. A recent meta-analysis of psychological and pharmacological treatments for BED found that psychotherapy and structured self-help treatments had more robust effects on outcomes, including binge abstinence [12]. Finally, the long-term efficacy of pharmacological treatments is largely unknown, owing to a lack of follow-up research [11].

## Cognitive Behavioral Therapy

### Rationale

The rationale for modifying CBT for BED is based on the restraint model of binge eating. This model posits that problematic eating patterns and concerns about shape and weight result in extreme restriction [13, 14]. This promotes a dysfunctional pattern of over- and under-restriction, in which patients alternate between dietary restraint and binge eating. The goal of CBT is to disrupt this “diet-binge cycle” by promoting healthier, more structured eating patterns (e.g., regular meals and snacks), improving shape and weight concerns, and encouraging the use of healthy weight-control behaviors (e.g., engaging in flexible dietary restraint). CBT encourages patients to normalize eating patterns by setting goals and using self-monitoring to develop flexible restraint and modify negative views of themselves in order to reduce binge eating.

## Empirical Evidence

Cognitive behavioral therapy is the most studied and well-established psychological treatment for BED [14]. Overall, research has shown that individual and group formats of CBT are associated with significantly higher abstinence rates compared with no treatment [13, 15–20], supportive therapy [21], and BWL [22–25, 26•, 27], with individual and group therapy formats producing similar long-term results [28].

The largest RCT to date to evaluate the efficacy of CBT for BED was conducted by Wilfley and colleagues [29] and compared group formats of CBT and IPT [29]. After 20 sessions of either CBT or IPT, 79% and 73% of participants respectively, were abstinent from binge eating, and 59% and 62% were abstinent at 1-year follow-up [29]. Further, an examination of long-term follow-up data showed that improvements were well maintained over 4 years [30•]. Studies that followed have provided further support for the effectiveness of CBT for BED.

A study comparing 15 sessions of CBT (63% abstinence) to a wait-list control (18% abstinence) demonstrated the superiority of CBT over no treatment [16]. At 1-year follow-up, 80% of the sample (including wait-list controls who had received CBT), were abstinent [16]. Additionally, Munsch and colleagues [27] found that CBT produced superior abstinence rates to BWL (i.e., 80% vs. 36% respectively, based on completer analyses) [27], and at 1-year follow-up, CBT was associated with significantly fewer binge days than BWL [27].

Studies have also examined the efficacy of CBT combined with pharmacological treatments. Grilo and colleagues [25] compared CBT plus placebo or fluoxetine with placebo or fluoxetine alone, and found that CBT conditions were associated with higher abstinence rates as compared with medication-only, suggesting that the addition of fluoxetine to CBT does not confer any additional benefit in terms of reducing binge eating [25]. Conversely, the addition of 200 mg of topiramate to CBT produced significantly larger abstinence rates (84% abstinence) compared with CBT plus placebo (61% abstinence); however, no follow-up was conducted [31]. Thus, it remains unclear as to which pharmacological agents, if any, may enhance the long-term effectiveness of CBT.

## Guided Self-Help CBT

Guided self-help CBT (CBTgsh) addresses the need for more widely disseminable therapies for BED. Such treatments are low cost and require minimal specialist care. The majority of CBTgsh treatments provide participants with the self-help manual *Overcoming Binge Eating* by Christopher Fairburn [32], as well as regular brief meetings with a therapist. Like traditional CBT, guided self-help targets binge eating by promoting regular eating patterns and moderate dietary restraint through self-monitoring and problem-solving strategies. The therapist's role is to encourage adherence, aid in goal development, and provide the rationale for CBTgsh. Studies have shown that CBTgsh produces superior outcomes compared with a wait-list control, treatment as usual, and guided self-help BWL [25, 33–36, 37•], and produces similar outcomes to IPT [39•] for individuals with low levels of additional pathology. It produces consistent reductions in binge eating and associated psychopathology at post-treatment and long term follow up [38].

In a primary care setting, Striegel-Moore and colleagues [37•] compared eight sessions of CBTgsh, which included an additional module targeting body checking and avoidance, to treatment as usual (TAU) [37•]. Post-treatment CBTgsh was associated with superior abstinence rates (64%) as compared with TAU (45%) [37•]. Attrition rates in this study were typical of those reported in others [25, 33]. In another large study, Wilson and colleagues [39•] found that CBTgsh and IPT were associated with similar abstinence rates (65% and

67%), and with significantly larger abstinence rates than BWL (47%) 2 years following treatment [39]. However, CBTgsh was associated with significantly larger attrition rates than IPT and was rated by participants as being less acceptable before the start of treatment [39]. Furthermore, CBTgsh was less effective than IPT for individuals with higher baseline binge eating frequency or lower self-esteem plus higher eating disorder psychopathology [39].

Additionally, a study comparing CBT formats requiring varying levels of therapist involvement found that, post-treatment, therapist-led and therapist-assisted (i.e., video-delivered psychoeducation followed by therapist-led discussion and homework review) CBT formats were more effective than a self-help group with no therapist involvement. However, by 12-month follow-up, the three groups produced similar abstinence rates, suggesting that laypersons delivering CBT in a group format may be as effective as therapist-led group CBT [34]. Importantly, however, 12-month abstinence rates reported in this study were quite low (around 20%) [34].

Recent studies have also examined CBTgsh delivered through scalable technologies, including the internet, but understanding of their long-term efficacy is limited. Two studies of web-based CBTgsh have shown them to be associated with significantly larger abstinence rates than a wait-list control [40]. Abstinence rates in these studies were sustained at 6 months, but neither compared CBTgsh with a control group at follow-up [40, 41]. Thus, it is clear that further research is warranted to elucidate the long-term effectiveness of CBTgsh delivered through scalable technologies that may be particularly attractive to adolescents and young adults.

Overall, research suggests that CBTgsh is an effective treatment for BED, particularly compared with no treatment. However, few studies have compared CBTgsh with active treatments [42]. Notably, CBTgsh is associated with higher attrition than specialist treatments (e.g., IPT and CBT) and appears to be less effective for individuals with a more severe pre-treatment eating disorder and general psychopathology [39, 43]. Thus, CBTgsh may be an appropriate treatment for individuals with BED that is uncomplicated by additional pathology (e.g., high negative affect, weight and shape concerns). Furthermore, the level of training required by a CBTgsh “therapist” is not clear and should be studied further. It may be that laypersons may provide guidance just as effectively as trained therapists for a subset of individuals.

## Interpersonal Psychotherapy

### Rationale

Interpersonal psychotherapy (IPT) has been applied to the treatment of BED based on a strong body of evidence demonstrating a consistent relationship between poor interpersonal functioning and eating disorders [44, 45]. The interpersonal model of binge eating posits that social problems create an environment in which binge eating develops and is maintained as a coping mechanism, serving to reduce negative affect in response to unfulfilling social interactions [46]. Binge eating may, in turn, worsen interpersonal problems by increasing social isolation and impeding on fulfilling relationships, thereby maintaining the eating disorder [46]. People with BED often present with suppressed affect; so, instead of expressing negative affect, they eat to cope. IPT helps individuals acknowledge and express this painful affect so that they can better manage negative feelings without turning to food. IPT also seeks to reduce binge eating pathology by supporting the development of healthy interpersonal skills that can replace maladaptive behaviors and promote a positive self-image [47].

## Empirical Support

Interpersonal psychotherapy is the only treatment that has shown comparable long-term outcomes to CBT. As discussed earlier, Wilfley and colleagues [29] compared CBT with IPT and found equivalent abstinence rates post-treatment, and at the 1-year and 5-year follow-ups [29, 30]. Further, IPT was shown to be more effective than BWL two years following treatment [39]. Psychodynamic IPT, similar to IPT but with an additional focus on reducing cyclical relational patterns and negative internalizations, was found to perform comparably to CBT both post-treatment and at 12-month follow-up [48]. IPT has also been applied to the treatment of loss of control eating in adolescents, and has demonstrated greater efficacy than a standard-of-care health education program [49].

Importantly, IPT demonstrates a number of advantages relative to CBT-based treatments, such that patients rate IPT as more acceptable and report greater expectations of success [39, 50, 51]. IPT may also be more effective for racial/ethnic minority patients, including African-Americans, who were less likely to drop out of IPT than CBTgsh and BWL in one study [39]. Finally, IPT has shown greater efficacy for patients with more severe eating pathology and lower self-esteem [39], and thus may be a more appropriate first-line treatment for such individuals.

## Behavioral Weight Loss Treatment

### Rationale

The majority of individuals with BED struggle with overweight and obesity and have a higher average body mass index (BMI; kg/m<sup>2</sup>) than their non-BED overweight and obese counterparts [52]. Thus, BWL, the most commonly implemented treatment for adult obesity, has been examined as a potential treatment for BED. BWL focuses on weight loss through moderate reductions in caloric intake and increased physical activity, rather than targeting binge eating directly. It is hypothesized that the improved eating and activity patterns promoted in BWL will result in less binge eating and successful weight loss.

### Empirical Evidence

Research shows that BWL is not as effective as specialist treatments for BED in reducing binge eating. Notably, a recent meta-analysis found that BWL only inconsistently produced reductions in binge eating [53]. A study that compared guided self-help formats of BWL and CBT found that CBTgsh was associated with significantly higher abstinence rates than BWLgsh and a wait-list control (46%, 18%, and 13% respectively) [25]. As described above, both IPT and CBTgsh were shown to produce superior binge abstinence rates compared with BWL 2 years following treatment [39]. Another study found that compared with BWL, CBT produced superior post-treatment abstinence rates and 12-month follow-up reductions in binge eating [27]. Researchers have also examined the efficacy of BWL in conjunction with CBT. Devlin and colleagues [23] compared 20 sessions of CBT plus BWL and either fluoxetine or placebo, to BWL plus placebo or fluoxetine [23]. Post-treatment, all CBT conditions were associated with significantly greater abstinence rates (62% overall) than BWL conditions (33% overall) [23]. Over the course of follow-up, abstinence rates increased in both groups, with CBT conditions remaining superior to BWL conditions at 2-year follow-up [24]. Similarly, a sequential program of CBT followed by BWL did not confer greater benefit than CBT alone with regard to binge abstinence at the 1-year follow-up [26]. However, preliminary data suggest that rapid responders in BWL do significantly better than non-rapid responders, with long-term binge abstinence rates similar to patients receiving specialist treatment, and weight loss maintained at 12-month follow up [26]. Thus, while BWL is more easily disseminable than CBT or IPT, when compared to

specialist treatments for BED, current evidence indicates that BWL is not an effective treatment for binge eating in the short- or long-term for most individuals.

## Dialectical Behavior Therapy

### Rationale

The modification of DBT for BED is based on the affect regulation model of binge eating, which posits that binge eating occurs in response to intolerable emotional experiences when more adaptive coping mechanisms are not accessible. Engaging in binge eating is hypothesized to provide temporary relief from negative affect, reinforcing the behavior. This model of binge eating has been the focus of considerable research, and has sparked interest in the use of DBT as a treatment for BED [54]. DBT comprises four focal areas: mindfulness, distress tolerance, emotion regulation, and interpersonal effectiveness. The latter component is often omitted in the study of DBT for BED to avoid overlap with IPT, and to decrease the length of treatment [55]. The main goal of DBT is the development of adaptive emotional regulation skills and their implementation in daily life [56].

### Empirical Evidence

Completer analyses from a large study of DBT for BED showed that 89% of DBT participants were abstinent post-treatment, compared with 12.5% of controls [56]. However, abstinence rates dropped to 56% at the 6-month follow-up and comparisons with the control group were not reported [56]. More recently, group DBT was compared with active comparison group therapy (ACGT) [57•]. ACGT was designed to share therapeutic factors with DBT (e.g., therapist alliance, therapeutic optimism, and treatment expectations), without any of the specific components of DBT or other BED treatments [57•]. Both DBT and ACGT resulted in comparable abstinence rates both post-treatment (64% and 36% respectively) and at the 12-month follow-up (64% and 56% respectively) [57•]. Importantly, DBT was associated with significantly lower dropout rates than ACTG, suggesting that DBT was more acceptable to participants [57•]. Furthermore, as discussed below, certain pretreatment participant characteristics predicted better outcome following DBT vs ACTG [58]. While these findings are promising, more research must be conducted to examine the long-term efficacy and success of DBT compared with other specialist treatments for BED.

## Alternative or Adjunctive Treatments

Additional treatments for BED have been studied, and may enhance outcomes when included within specialist treatment programs. Appetite Awareness Training targets binge eating by promoting recognition of and response to internal rather than external food cues, and has been associated with greater reductions in binge eating than a wait-list control [59]. Mindfulness has also shown some promise as an adjunct treatment for BED. The purpose of mindfulness is to increase awareness of binge triggers, while increasing self-control and maintaining an attitude of self-acceptance [60]. An initial pilot study of mindfulness-based CBT reported post-treatment abstinence rates of 40% [60]. Finally, adding exercise and virtual reality therapy to specialist treatments for BED has shown efficacy for enhancing weight loss and body image outcomes respectively [61–65]. In sum, adjunct therapies for BED may garner more robust treatment outcomes, but this possibility must be tested in larger and more diverse samples.

## Additional Treatment Considerations

### Weight and Shape Concerns

A large number of individuals with BED endorse overconcern about weight and shape. Clinical levels of overconcern, referred to as overvaluation of weight and shape, have been



associated with greater pre-treatment psychopathology and poorer treatment outcome, and researchers have suggested it be included in the DSM-5 as a severity specifier [66]. Thus, effective treatments for BED must also have an impact on weight and shape concerns in order to truly reduce distress and prevent relapse among those with BED.

Indeed, in studies that have included weight and shape concerns as an outcome, treatments for BED have shown a positive impact. CBT has been shown to be associated with significantly greater reductions in weight and shape concerns compared with no treatment and fluoxetine in both the short and the long term [19, 67]. Furthermore, CBT, CBTgsh, BWL, and IPT are associated with similar decreases in weight and shape concerns, both post-treatment and at up to 2 years following treatment [27, 29, 37•, 39•].

## Weight Loss

Treatments for BED have demonstrated a minimal impact on weight loss. However, studies have shown that including an exercise component in CBT is associated with greater weight loss compared to CBT-only, suggesting that exercise might enhance clinically meaningful and sustained weight loss following specialist treatment for BED.

Although studies have shown that BWL produces significantly greater weight loss post-treatment (as compared to CBT, IPT, and CBTgsh), these differences are not maintained long-term [27, 39•]. Furthermore, the addition of BWL during or following CBT does not appear to confer any additional benefit [23, 24, 26]. Notably, one study found that those abstinent from binge eating following CBT who subsequently received BWL experienced weight loss post-treatment (average of 4.0 kg), whereas those who were not abstinent experienced weight gain (average of 3.8 kg) [15]. Thus, BWL may be an effective weight-loss treatment for those who are abstinent from binge eating following specialist treatment, but this finding must be replicated.

Nonetheless, research suggests that abstinence from binge eating is associated with long-term weight maintenance and modest weight loss [26•, 27, 30•, 39•, 68]. Importantly, one study found that individuals with BED reported an average 12-month weight gain of 15 pounds before beginning treatment, whereas weight has been shown to remain stable for up to 4 years following group CBT and IPT [30•, 69]. This can be illustrated by using the example of a patient who binges the minimum of four times per month. If a binge is estimated to contain 1,000 kilocalories, then binge abstinence will prevent the intake of 4,000 kilocalories per month, thus preventing weight gain of 1.1 pounds per month, and 13.7 pounds per year [70]. Thus, psychological treatments for BED likely prevent the upward weight trajectories of individuals with BED.

## Predictors, Mediators, and Moderators of Treatment

A number of predictors, mediators, and moderators (i.e., predicts differential treatment response at different levels of the moderator) of treatment outcomes have been identified. These data may be useful in developing stepped-care models that optimize treatment type, duration, and intensity for a given individual, with the ultimate goal of producing more robust outcomes and lowering overall treatment costs.

### Nonspecific Predictors

**Rapid Response**—The best-studied predictor of treatment outcome is rapid response, defined as 65–70% reduction in binge eating by the fourth treatment session [71–74]. These studies show that compared to nonrapid responders, rapid responders are more likely to be abstinent immediately following BWL, BWLgsh, and fluoxetine. Conversely, in CBT and CBTgsh, rapid responders and non-rapid responders show similar abstinence rates up to

12 months post-treatment [71–74]. Notably, one study found that a 15% reduction in binge eating by week 1 rather than a 65–70% reduction by week 4, was predictive of post-treatment abstinence following therapist-moderated and self-help CBT treatments [75]. Further defining the influence of rapid response on treatment outcome may enable providers to identify when treatments should be discontinued versus when further improvements can be expected. Furthermore, identifying baseline predictors of rapid response may enhance the potential for matching treatments to individuals with certain baseline characteristics.

**Pretreatment Psychopathology**—Higher baseline psychopathology has consistently been found to have a negative impact on the effectiveness of BED treatments [39•, 76–80]. Personality disorders have been shown to predict greater post-treatment eating disorder psychopathology and depression following CBTgsh and BWLgsh [77], as well as higher levels of binge eating one year following group CBT and IPT [76, 79]. In addition, pre-treatment depressive symptoms predicted reduced likelihood of post-treatment abstinence following CBT [78], and a lifetime history of depression predicted reduced likelihood of abstinence for 2 years following IPT, BWL, and CBTgsh [39•]. Further, higher trait negative affect was associated with higher post-treatment eating disorder psychopathology and attrition from CBTgsh [77].

**Weight and Shape Concerns**—Reductions in weight concerns over the course of treatment have been found to fully mediate the association between CBT and abstinence [16]. Similarly, greater weight and shape concerns have been found to predict less likelihood of post-treatment abstinence following group CBT and IPT [79], as well as greater levels of eating disorder psychopathology following CBTgsh [77]. Furthermore, Grilo and colleagues found clinical overvaluation of weight and shape to be the most salient predictor of post-treatment and 12 month abstinence following both CBT and fluoxetine [81•].

**Dietary Restraint**—Overall, moderate dietary restraint, which is an ultimate goal of CBT-based therapies, is associated with better treatment outcome. Increases in flexible restraint and decreases in rigid restraint over the course of CBTgsh were found in one study to predict higher likelihood of abstinence post-treatment and at the 3-month follow-up [82]. Higher pre-treatment maladaptive restraint was found to predict relapse for 6 months following DBT [83]. Additionally, a greater number of previous diet attempts were found to predict a lower likelihood of post-treatment abstinence following CBT [78]. Furthermore, classifying patients into *pure dietary restraint* (DR) and *dietary restraint-negative affect* (DRNA) subtypes demonstrates some predictive validity [84]. The DRNA subtype is associated with greater frequency of binge eating post-treatment compared with the DR subtype, suggesting that individuals who display high levels of dietary restraint *and* negative affect represent a more severe and treatment-resistant subtype of BED [84].

## Demographics

Lower levels of educational attainment have been found to predict poorer treatment outcome. Lower education was found to predict non-abstinence following IPT, CBTgsh, and BWL [38]. Additionally, a meta-analytic review of predictors of treatment response found that lower education predicted higher binge frequency and lack of binge remission following treatment [85]. This review also found that African-Americans were more than twice as likely to drop out of treatment as compared with Caucasians. However, African-Americans demonstrated greater reductions in global eating disorder psychopathology than their Caucasian counterparts. Additionally, an earlier age of onset of binge eating (at or before age 16) was found to predict lack of abstinence post-treatment [105].



Grilo and colleagues [81•] also identified important demographic predictors of treatment outcome. They found that, when comparing CBT plus fluoxetine, CBT-only, and fluoxetine-only, younger participants were more likely to achieve abstinence than older participants when given fluoxetine, whereas older participants saw greater reductions in depression if given CBT. Further, older age at BED onset predicted faster reductions in binge eating frequency and eating disorder psychopathology if receiving CBT versus fluoxetine-only.

## Moderators

Only a limited number of studies have identified moderators of treatment outcome. Sysko and colleagues [43] identified two classes of severity that predicted differential response to IPT, CBTgsh, and BWL [39•, 43]. The highest rates of abstinence were found for “class 2” (i.e., most frequent binge eating and compensatory behaviors, highest weight and shape concerns and negative affect, and most distress) individuals receiving IPT and “class 3” (i.e., similar levels of binge eating to “class 2,” with lower levels of exercise and compensatory behaviors) individuals receiving CBTgsh [43]. Within this sample, IPT was also associated with superior 2-year abstinence rates among participants with lower baseline self-esteem and/or higher baseline eating disorder psychopathology [39•].

Grilo and colleagues [81•] found that higher pretreatment binge eating frequency predicted greater reductions in eating disorder psychopathology if receiving CBT as opposed to fluoxetine [81•]. Additionally, participants with lower self-esteem saw greater reductions in depression if they received CBT rather than fluoxetine. Finally, those categorized as having negative affect or overvaluation of weight/shape subtype saw greater reductions in eating disorder pathology and depression if receiving CBT versus fluoxetine [81•]. Furthermore, although DBT and active comparison group therapy (ACGT) were found to produce similar long-term outcomes, those who reported earlier onset of overweight and dieting (i.e., <15 years old) or who met criteria for avoidant personality disorder reported a reduction in binge days post-treatment only if they received DBT [58].

Overall, current research has identified nonspecific predictors of both short-term and long-term abstinence, such as rapid response, negative affect, weight/shape concerns, and extreme dietary restraint. These variables have also been found to predict dimensional outcomes, including depression and eating disorder psychopathology. A small number of studies have identified moderators of treatment outcome, including pre-treatment eating disorder severity, negative affect, and overvaluation of weight and shape. Further research is needed to replicate these findings and to establish the reliability of these predictors and moderators in order to inform the development of treatment matching algorithms and stepped-care models.

## Future Directions

A potential next step for clinicians and researchers is to respond to the National Institute for Mental Health’s strategic plan (National Institute of Mental Health Strategic Plan, <http://www.nimh.nih.gov>) to:

1. Enhance the public health impact of current treatments
2. Incorporate the diverse needs of patients
3. Promote discovery in the brain and behavioral sciences
4. Chart mental illness trajectories to determine when, where, and how to intervene.

## Enhance the Public Health Impact of Current Treatments

There is a need to translate evidence-based treatments for BED into clinical settings in order to increase access to care. Although there are robust treatments for BED, their use in clinical

practice is relatively scarce [86]. Dissemination and implementation science will enable the identification of the most effective strategies for training practitioners and implementing treatments in diverse clinical settings in a sustainable manner. For example, researchers may examine the relative effectiveness of traditional training models (e.g., expert-led workshops) versus models that promote systemic change (e.g., training staff to become expert trainers and supervisors), to identify which will most likely increase adoption, penetration, and sustainability of treatments.

Furthermore, the potential for telecare, the internet, and other technologies to enhance access to treatments for BED is a burgeoning area of research. For example, one study found that email bulimia therapy (i.e., participants interacting with therapists via email) was more effective than self-directed writing and a wait-list control in reducing binge eating [87]. Internet-based CBTgsh has also shown preliminary efficacy [88, 40, 41], and other technologies such as texting and daily electronic diaries have shown efficacy for problems such as smoking and obesity [89, 90]. Such studies demonstrate that scalable therapies for BED may be as effective as more intensive treatments. However, relatively high attrition rates seen in such therapies must be addressed effectively by, for example, enhancing treatment engagement and adherence (e.g., adding social networking components).

### **Incorporating the Diverse Needs of Patients**

Research suggests that certain treatment modalities are more effective than others for individuals with particular pretreatment characteristics. Incorporating such knowledge into treatment planning may enable the development of successful stepped-care models. For example, individuals with BED uncomplicated by additional pathology may be initially treated with CBTgsh, whereas those with high levels of eating disorder psychopathology or negative affect may be treated initially with group or individual IPT or CBT (see Fig. 1). Additionally, methods for adapting treatments to specific sub-populations (e.g., ethnic minorities) are still a matter of inquiry. Notably, studies suggest that African-Americans with BED are less likely to drop out of IPT than CBTgsh and BWL [39•]. It will be important to include key stakeholders (e.g., patients, families, community health providers) in treatment development to modify treatments so that they address eating- and weight-related issues in a manner appropriate and acceptable to the target population.

### **Promote Discovery in the Brain and Behavioral Sciences**

Treatments that can simultaneously address binge eating and obesity may be identified through basic biological and behavioral research investigating their causal mechanisms. Research has shown that high fat/sugar foods, and drugs of abuse act similarly on brain reward pathways [91, 92], and there is growing evidence of brain reward dysfunction in both BED and obesity [93–95].

Such brain abnormalities may be linked with behavioral problems [93], sometimes labeled “reinforcement pathology” [96], including high impulsivity and the inability to delay gratification [97–99]. In addition, overabundance of high fat/sugar foods in the environment may place individuals with genetic, neurological, and/or cognitive-behavioral vulnerabilities at increased risk of the development of binge eating and obesity.

As such, psychological treatments for BED may produce even more robust outcomes when including adjuvant pharmacotherapies or behavioral therapies that specifically target brain reward system abnormalities associated with reinforcement pathology. For example, a behavioral therapy that targets high food reinforcement may focus on enhancing the availability of alternate reinforcers across the home, school/work, and community milieus. Indeed, treatments with a socio-environmental approach have been shown to produce weight

maintenance in the long term for overweight children [100, 101], as such strategies create healthy zones across settings and promote sustainable outcomes. The integration of state-of-the-science research on the treatment and prevention of both BED and obesity is crucial to producing more robust treatment outcomes.

### **Chart Mental Illness Trajectories to Determine When, Where, and how to Intervene**

It is well-known that binge eating pathology in childhood and adolescence is associated with excess weight gain over time and increased risk of developing BED [7, 102, 103]. Early identification and treatment of children at risk for the development of BED will be critical, as psychological interventions are likely to be most potent during transitional periods of adolescent brain development [104]. Treatment studies with children and adolescents with early onset or at high risk of developing BED are imperative. IPT has been modified for adolescent girls with loss of control eating to be efficacious for reducing eating pathology and preventing weight gain [102]. Furthermore, developing, implementing, and evaluating therapist-led and internet-based treatments within multiple contexts (e.g., school, primary care, home) will be crucial in establishing the long-term health outcomes.

### **Conclusion**

Overall, research shows that CBT, IPT, and CBTgsh, which directly target binge eating and associated pathology, are associated with the most robust short- and long-term binge abstinence rates. Additionally, DBT shows promise as a specialist treatment for BED, but further research is needed to elucidate its long-term efficacy compared with nonspecific and established therapies for BED. Furthermore, a number of treatment adjuncts (e.g., mindfulness, physical activity) have shown preliminary efficacy and may be useful for improving overall health, well-being, and sustainability of outcomes. Conversely, BWL, a generalist treatment that targets weight loss rather than binge eating, does confer some benefit but is not as effective as specialist treatments.

Important nonspecific predictors and moderators of treatment outcomes have been identified. Greater pre-treatment eating disorder psychopathology and negative affect are negative prognostic indicators for all BED treatments. However, when low-dose treatments (e.g., CBTgsh) and pharmacotherapy (e.g., fluoxetine) are compared with more intensive treatments (e.g., IPT and CBT), the latter are more effective for those with more severe illness. Rapid response, weight and shape concerns, and extreme dietary restraint are also nonspecific predictors of treatment outcomes. Continued research into this area will enable the development of stepped-care treatment models. Future practice and research is required to maximize the availability, accessibility, and effectiveness of evidence-based psychological treatments for BED, as well as their ability to target binge eating and weight control simultaneously.

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majority of participants had a diagnosis of full-syndrome or sub-clinical BED (89%), whereas the other 11% had a diagnosis of bulimia nervosa. Post-treatment, and 6-month and 12-month follow-up data were collected. At the 12-month follow-up, CBTgsh was associated with higher abstinence rates than treatment as usual (64% vs 45%). CBTgsh was also associated with greater reductions in eating disorder psychopathology (i.e., dietary restraint and shape, weight, and eating concerns) and improvements in social adjustment.

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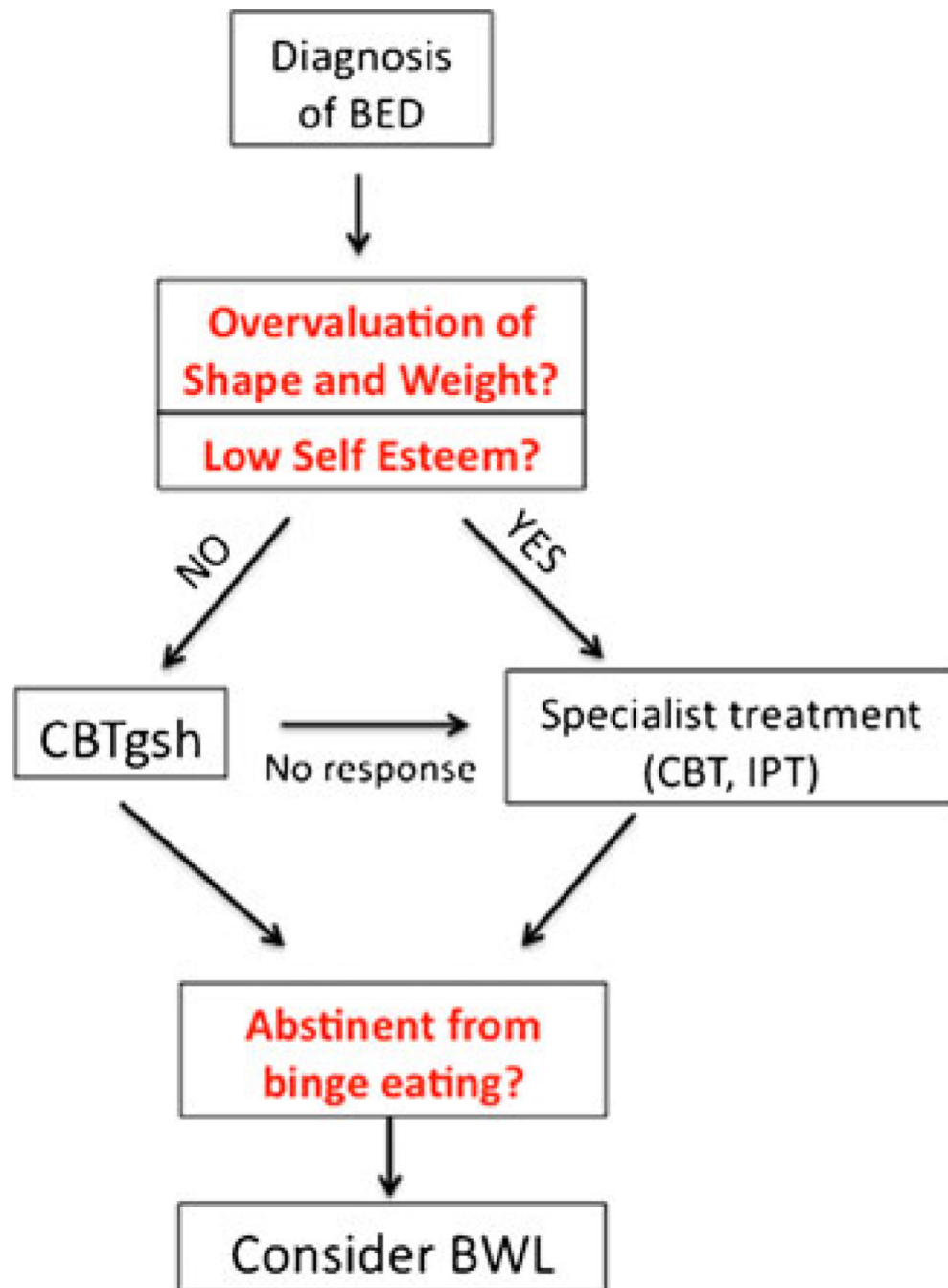
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**Fig. 1.** Potential stepped care model for the treatment of binge eating disorder (BED)

**Table 1**

## Overview of the psychological treatments for binge eating disorder (BED)

Treatment	Theoretical approach	Treatment targets	Empirical support for BED
Behavioral weight loss (BWL)	Promote weight loss by decreasing energy intake and increasing energy expenditure	Making gradual lifestyle changes in diet, exercise, and eating habits	No strong empirical support for BWL over specialist treatments for BED on either weight loss or eating pathology outcomes
		Self-monitoring of food intake, exercise, and thoughts about food	Specialized treatments are more effective than BWL in the long term
		Weight loss goal of one pound per week	BWL may be an effective weight loss option for responders to CBT or IPT
Cognitive behavioral therapy (CBT)	Disturbed eating patterns and problematic thoughts/beliefs related to eating, shape, and weight contribute to binge eating	Address chaotic eating patterns (e.g., encourage regular meals)	Strong empirical support for therapist-led CBT in short- and long-term outcomes
		Change dysfunctional thoughts about the self and the importance of weight and shape	Self-help CBT may represent a worthwhile first-line treatment; however it is not recommended for patients with low self-esteem and/or high shape and weight concerns. Retention also remains a challenge.
		Encourage healthy weight-control behaviors (e.g., self-monitoring and exercise)	
Interpersonal psychotherapy (IPT)	Interpersonal stressors contribute to using binge eating as a way to cope with negative affect	Target social deficits and promote mastery in interpersonal domains	Strong evidence demonstrating a short- and long-term reduction in binge eating, comparable to results found in CBT
		Address problems in four primary areas: interpersonal deficits, interpersonal role disputes, role transitions, and grief	
Dialectical behavior therapy (DBT)	Difficulty regulating affect leads to pathological or maladaptive behaviors, such as binge eating	Teach healthier ways to modulate negative emotional arousal	Preliminary research shows promising results for binge abstinence.
		Achieve proficiency in four domains: mindfulness skills, distress tolerance, emotion regulation, and interpersonal effectiveness	More research must be conducted to examine its long-term efficacy and success compared with other specialist treatments



Table 2

Selected randomized controlled trials of treatments for BED

Study	Treatment conditions	n	Male (%)	Caucasian (%)	Attrition rate (%)	Dose	Post-treatment outcome (% abstinent)	Follow-up outcome (% abstinent)
[13]	a) CBT	23	0	91	17	10 sessions (10 weeks)	a) 79* b) 0	a) 46% remained abstinent
	b) Wait-list control	21			0			
[20]	a) CBT	18	0	86	33	16 sessions (16 weeks)	a) 28* b) 44*	NR
	b) IPT	18			11			
	c) Wait-list control	20					c) 0	
[22]	a) BWLT	37	0	NR	27	30 sessions (36 weeks)	a) 19 b) 37	a) 14 b) 28
	b) BWLT + CBT	36			17		c) 41	c) 32 (3 month)
	c) BWLT + CBT + desipramine	36			23		a) 55*	(see [15])
[105]	a) CBT	39	14	NR	14	12 sessions (12 weeks)	a) 55* b) 9	NR
	b) Wait-list control	11			9		b) 9	
[15]	a) BWLT + CBT	93	0	92	18	30 sessions (36 weeks)	a) 33	NR
	1-year follow-up data from [17,22, 105]							
[33]	a) Guided self-help CBT	24	0	97	33	Self directed (12 weeks)	a) 50* b) 43*	a) 41, 50 b) 37, 40
	b) Unguided self-help CBT	24			0		c) 8	(3, 6 months)
	c) Wait-list control	24			4 (12% overall)		a) 69* b) 68*	a) 55, 56, 67 b) 69, 70, 85
[35,36]	a) Therapist-led CBT	16	0	97	12	14 sessions (8 weeks)	a) 69* b) 68*	c) 64, 75, 75 (1, 6, 12 months)
	b) Partial self-help CBT	19				10	c) 87*	
	c) Structured self-help CBT	15	0		27		d) 13	NR
	d) Wait-list control	11			18		a) 68* b) 55	
[106]	a) CBTgsh	40 (82.5% BED)	0	95	3	a) 6 sessions (10 weeks) b) 10 weeks	a) 67 b) 44	
	b) CBT unguided self-help	37	0	NR	14	15 sessions (15 weeks)	a) 67 b) 44	a) 86* b) 44 (6 months)
[68]	a) Cognitive therapy	37	0	NR	14	15 sessions (15 weeks)	a) 67 b) 44	a) 59 b) 62 (12 months)
	b) Behavioral therapy	37						
[29]	a) CBT	81	17	94	11	20 sessions (20 weeks)	a) 79 b) 73	
	b) IPT	81	17	91	9			

Study	Treatment conditions	n	Male (%)	Caucasian (%)	Attrition rate (%)	Dose	Post-treatment outcome (% abstinent)	Follow-up outcome (% abstinent)
[25]	a) CBTgsh	37	21	77	13	Self directed (12 weeks)	a) 46*	No follow-up
	b) BWLTgsh	38			33		b) 18	
	c) Wait-list control	15			13		c) 13	
[25]	a) CBTgsh + orlistat	25	12	88	24	6 brief individual sessions (12 weeks)	a) 64*	a) 52
	b) CBTgsh + placebo	25			20		b) 36	b) 52 (3 month)
[25]	a) CBT + fluoxetine	26	23	89	23	16 sessions (16 weeks)	a) 50*	No follow-up
	b) CBT + placebo	28	21	93	21		b) 61*	
	c) Fluoxetine	27	30	100	22		c) 22	
	d) Placebo	27 (108)	15 (22)	74 (89)	15 (20)		d) 26	68, 61, 70, 74 (6, 12, 18, 24 months)
[23,24]	a) BWLT + CBT + fluoxetine	28	22	77	32	16 sessions (BWLT)	a&b) 62* (CBT)	CBT>BWLT (24 months)
	b) BWLT + CBT + placebo	25				20 sessions (CBT) (5 months)	c&d) 33 (BWLT)	
[48]	c) BWLT + fluoxetine	32					a) 62*	a) 65, 68
	d) BWLT + placebo	31					b) 60*	b) 62, 57 (12 months)
	a) Group CBT	47	9	98	21	16 sessions (16 weeks)	c) 9	No follow-up
[31]	b) Group psychodynamic IPT	48					a) 84*	
	c) Wait-list control	40			18		b) 61	
[16]	a) Group CBT + topiramate	37	3	62	19	19 sessions (21 weeks)	a) 63*	a & b) 80 (groups analyzed together) (12 month)
	b) Group CBT + placebo	36	6	53	28	15 sessions (20 weeks)	b) 61	a) 52
[37]	a) CBT	30	6	NR	7		b) 18	
	b) Wait-list control	22			0		a) 41	
[107]	a) CBT	44	9	NR	30	16 sessions (16 weeks) + 6 monthly follow-up sessions	b) 58*	b) 50 (12 month)
	b) BWLT	36	14		25		a) 8	a) 22
	a) Group CBT	22	9	68	32	10 sessions (10 weeks)	b) 13	b) 13 (2 months)
[108]	b) CD-ROM CBT	22	9	64	41	10 weeks	a) 28*	NR
	c) Wait-list control	22	5	77	9			
	a) Adapted motivational interviewing (AMI)	54	0	89	11	1 AMI session + self-Help handbook		

Study	Treatment conditions	n	Male (%)	Caucasian (%)	Attrition rate (%)	Dose	Post-treatment outcome (% abstinent)	Follow-up outcome (% abstinent)
[25]	b) Control	54			15	Self-help handbook	b) 11%	
	a) CBT + booster session	18	0	NR	6	8 sessions (8 weeks) + 5 booster sessions during follow-up	a) 11*	a & b) 41, 23, 25 (3, 6, 12 months)
[109]	b) Wait-list control	18			0		b) 0	
	a) Psychoeducational treatment (PET)	13	0	91	8	11 sessions (12 weeks) a and	b) 78 (groups analyzed together)	a and b) 87 (12 months)
[57]	b) Wait-list control	27			59		a) 64	a) 64
	a) DBT-BED	50	14	80	4	20 sessions (21 weeks)	b) 33	b) 49 (12 months)
[37]	b) Active comparison group therapy (ACGT)	51	16	73	33		a) 64*	a) 75*, 64*
	a) CBT-GSH	59	8	98	12	a) 8 sessions (12 weeks)	b) 28	b) 44, 45 (26, 52 weeks)
[39]	b) Treatment as usual (control)	64 (48% BED)			6		a) 62	a) 59, 62
	a) CBTgsh	66	18	82	30	10 sessions	b) 67	b) 55, 64
[41]	b) IPT	75	15	77	7	20 sessions	c) 64	c) 50, 47 (12, 24 months)
	c) BWLT	64	11	88	28	20 sessions (24 weeks)	a) 35*	a) 43
[26]	a) CBTgsh (internet-based)	37	0	NR	24	Self directed (6 months)	b) 8	b) NR (6 months)
	b) Wait-list control	37			11		a) 44	a) 51, 51
[110]	a) CBT	45	36	76	24	a & b) 16 sessions (24 weeks)	b) 38	b) 33, 36
	b) BWLT	45	38	80	31	c) 16 sessions (16 weeks —CBT); 16 sessions (24 weeks—BWLT)	c) 49	c) 49, 40 (6, 12 months)
[110]	c) CBT followed by BWLT	35	20	74	40		a) 60	NR
	a) CBT + diet	25	24	80	20	21 sessions (6 months)	b) 72	
	b) CBT + nutritional counseling	25			8			

\* Significant difference