

The efficacy of cognitive-behavioral therapy for eating disorders: A systematic review and meta-analysis.

Abstract

Objective: This meta-analysis examined the efficacy of cognitive-behavioural therapy (CBT) for eating disorders. **Method:** Randomized controlled trials of CBT were searched. Seventy-nine trials were included. **Results:** Therapist-led CBT was more efficacious than inactive (wait-lists) and active (any psychotherapy) comparisons in individuals with bulimia nervosa and binge eating disorder. Therapist-led CBT was most efficacious when manualized CBT-BN or its enhanced version was delivered. No significant differences were observed between therapist-led CBT for bulimia nervosa and binge eating disorder and antidepressants at post-treatment. CBT was also directly compared to other specific psychological interventions, and therapist-led CBT resulted in greater reductions in behavioural and cognitive symptoms than interpersonal psychotherapy at post-treatment. At follow-up, CBT outperformed interpersonal psychotherapy only on cognitive symptoms. CBT for binge eating disorder also resulted in greater reductions in behavioural symptoms than behavioural weight loss interventions. There was no evidence that CBT was more efficacious than behaviour therapy or non-specific supportive therapies. **Conclusions:** CBT is efficacious for eating disorders. Although CBT was equally efficacious to certain psychological treatments, the fact that CBT outperformed all active psychological comparisons and interpersonal psychotherapy specifically, offers some support for the specificity of psychological treatments for eating disorders. Conclusions from this study are hampered by the fact that many trials were of poor quality. Higher quality RCTs are essential.

Keywords: Cognitive-behavioral therapy; Eating Disorders; Bulimia Nervosa; Binge eating

Public Health Significance: This meta-analysis demonstrates that CBT is an efficacious psychological treatment for individuals with eating disorders. CBT produces large and long lasting improvements in core behavioural and cognitive symptoms of eating disorders.

Cognitive-behavioural therapy (CBT) is the most widely investigated eating disorder treatment. Randomised controlled trials (RCTs) demonstrate that specific forms of CBT produce large improvements in eating disorder symptoms in individuals with bulimia nervosa (BN), binge eating disorder (BED), Other Specified Feeding and Eating Disorders (OSFED), and anorexia nervosa (AN) (Byrne et al., 2017; Fairburn et al., 2015; Fairburn et al., 1991). Clinical guidelines recommend specific forms of CBT as the treatment of choice for these BN, BED, and OSFED, and also as one of the front-running treatments for AN (Hay et al., 2014; Herpertz et al., 2011; National Institute of Clinical Excellence, 2017).

The results across RCTs have been synthesized in meta-analyses. A summary of these meta-analyses is presented in Table 1 of the Supplementary Materials. Compared to wait-list or active controls, therapist-led CBT consistently results in greater improvements in eating disorder symptoms in BN and BED (e.g., Hay, Bacaltchuk, Stefano, & Kashyap, 2009). Moreover, specific modes (e.g., E-therapy CBT) or formats (e.g., group-based CBT) have also been shown to be superior to wait-list controls in BN and BED (Loucas et al., 2014; Polnay et al., 2014). In contrast, one meta-analysis has examined the effects of CBT for AN (Hay, Claudino, Touyz, & Abd Elbaky, 2015), estimating effect sizes for two comparisons: CBT compared to treatment as usual, and CBT compared to interpersonal psychotherapy (IPT) or short-term focal psychodynamic therapy. Effect sizes were based on two studies, and the pooled effect size was not significantly different from zero for BMI and eating disorder symptom outcomes. These findings only included only two effect sizes, and some RCTs of CBT for AN (Touyz et al., 2013) were excluded from this review because the focus of the review was on treatment that assertively promoted weight gain. The power of these comparisons could be improved by comparing CBT to all available active controls in all available studies that have sampled individuals with AN. In sum, there is evidence supporting

the efficacy of CBT for BN and BED, and while numerous trials have documented the efficacy of CBT for AN, CBT has not been shown to outperform comparison interventions.

Important Questions to be Addressed

Previous meta-analyses of CBT for eating disorders have not addressed several important questions. First, recent meta-analyses of CBT for eating disorders have not assessed the effect of CBT on cognitive symptoms. Pooled effect sizes have only been calculated for binge eating and/or purging behaviour. There is evidence to suggest that individuals with eating disorders who are considered clinically recovered because of their abstinence from binge eating or purging still report significant cognitive symptoms (Keski-Rahkonen et al., 2009). This is concerning, as residual cognitive symptoms following CBT have been shown to predict relapse in BN (Fairburn, Peveler, Jones, Hope, & Doll, 1993). Consequently, authors have recently argued that treatment success should be based on both behavioural and cognitive symptoms (Williams, Watts, & Wade, 2012).

Second, each meta-analysis has focused only on the effects of CBT for a specific eating disorder diagnosis. The growing interest on transdiagnostic theories across different psychopathologies means that more RCTs are delivering CBT to individuals across diagnostic criteria (e.g., Fairburn et al., 2015; Fairburn et al., 2009). It is therefore not known whether CBT is an effective treatment for transdiagnostic samples. An updated meta-analysis including all eating disorder presentations is also timely pertinent.

Third, the relative short and long-term effects of CBT and pharmacological treatments for eating disorders are unknown. Antidepressants are recommended for treating BN and BED, as antidepressants have been shown to outperform placebo-controls (Brownley et al., 2016; Hay et al., 2014). Indeed, an early meta-analysis that compared therapist-led CBT for BN to antidepressants found no significant differences in behavioural remission rates at post-treatment (Hay, Claudino, & Kaio, 2001). Since 2001, several additional trials comparing

CBT to antidepressants have been conducted, so an updated meta-analysis of these comparisons is required. Moreover, it is also unknown whether the equivalence observed between CBT and antidepressants is (a) sustained at follow-up, (b) generalises to cognitive symptoms, and (c) occurs in individuals with BED or OSFED.

Fourth, few moderators of the effectiveness of CBT have been assessed. Identifying moderators is important for enhancing understanding of the specific conditions under which CBT is most effective. Of the few moderators tested (i.e., CBT modality, the use of homework, therapist pre-training, and therapist allegiance), none have been found to relate to CBT's effectiveness (Spielmans et al., 2013). Thus, given that the specific conditions that are associated with CBT's effectiveness have not been identified, it is important to test additional moderating variables so that we can have a clearer understanding of the circumstances and conditions that make CBT more or less effective and for whom they do so.

One potentially important moderator that has not been investigated is the type of cognitive-behavioural protocol delivered. Although several overlapping but distinct CBT protocols for eating disorders exist, a specific manualized form of CBT developed by Fairburn and colleagues' is recommended as the treatment of choice. This treatment was originally designed as a treatment for BN (CBT-BN), but it has since been enhanced to have a transdiagnostic scope (CBT-E; Fairburn, 2008). Both CBT-BN and CBT-E are designed to disrupt the maintaining mechanisms that are outlined in their underlying cognitive-behavioural model, which is empirically supported (Pennesi & Wade, 2016). CBT-BN typically consists of 19 individual treatment sessions. CBT-E typically consists of 20 individual treatment sessions for normal weight eating disorders, and 40 individual treatment sessions for underweight eating disorders (Fairburn, 2008). Although some have suggested that CBT-E might be superior to CBT-BN and other CBT protocols, no trials have directly compared these protocols. Thus, a first step in determining their relative efficacy is to

examine and compare the size of the effect for trials that have administered these distinct cognitive-behavioural treatment protocols.

The fifth question yet to be addressed is whether CBT outperforms other *specific* psychological treatments. To date, three meta-analyses have directly compared CBT to other specific psychological treatments on behavioural symptoms. Two of these compared CBT to behavioural interventions (Hay et al., 2009; Spielmans et al., 2013). While Hay et al (2009) found CBT to outperform behavioural interventions ($k=4$) on rates of remission in individuals with BN, Spielmans et al. (2013) reported no significant difference in outcomes between these treatments in individuals either with BED ($k=4$) or with BN ($k=8$). The third meta-analysis directly compared CBT to IPT on behavioural outcomes for BN and BED (Cuijpers, Donker, Weissman, Ravitz, & Cristea, 2016). The authors found a small but statistically significant effect ($g= 0.20$) in improved behavioural symptoms at post-treatment in favour of CBT. However, these analyses did not include a comparison at follow-up. The importance of such direct comparisons of CBT to other psychological treatments is twofold. First, these may provide direct and stronger evidence of the relative efficacy of CBT, and may therefore confirm current clinical practice guidelines which recommend CBT over other psychological interventions. Second, if they find evidence indicating the superiority of CBT, the result would (a) provide support for the theoretical model underpinning the CBT, and (b) challenge the widely endorsed common factors model.

The Current Meta-Analysis

Over 15 RCTs of any mode of CBT for eating disorders have been published since the last broadly focused meta-analysis. It is therefore timely and pertinent to conduct an updated meta-analysis on the efficacy of CBT for eating disorders, addressing the unanswered questions listed above. The current meta-analysis has three specific aims: First, we aim to investigate whether CBT for each eating disorder presentation is more efficacious than

inactive (e.g., wait-list), active (e.g., alternative psychotherapy approaches), and pharmacological comparisons at post-treatment and follow-up. Second, we aim to test whether these effects are moderated by sample age, CBT format, and CBT protocol. Third, we aim to perform meta-analyses directly comparing CBT to specific alternative psychological treatments at post-treatment and follow-up.

Method

Search Strategy

Five online databases were searched in June 2017: Medline (421 hits), PsycINFO (436 hits), EMBASE (546 hits), CINAHL (181 hits), and the Cochrane library (387 hits). The following terms were combined using the “AND” Boolean operator and searched in the five databases: *eating disorder*, *bulimi**, *anorexi**, *EDNOS*, *OSFED*, *bing**, AND *CBT**, *cognitive-behav*, *cognitive behav**, AND *random**, *trial**, *RCT*, *controlled*, *allocat**, *assign**. Additional searches were conducted to obtain data from unpublished trials. Using the same key terms, several databases containing grey literature were searched: PsycEXTRA (18 hits), ProQuest Central (25 hits), and PsycINFO (21 hits). All authors from the included published trials studies were contacted with a request for unpublished data. Clinical trials registries were also searched for ongoing trials (3 hits). A flowchart of the search strategy is presented in Figure 1.

Inclusion Criteria

Studies were included that (a) administered CBT (b) to individuals with any diagnosis of an eating disorder (c) in a RCT where (d) an inactive (e.g., wait-list), active (i.e., a non-CBT psychological treatment), or pharmacological comparison was administered. We excluded trials that either (a) only compared variants of CBT (e.g., group vs. individual

format), or (b) administered a multidisciplinary treatment (i.e., included aspects of CBT and aspects of other distinct psychological treatment approaches).

Study Selection

Duplicate records were removed once the search strategy outputs were combined. Titles and abstracts were screened to identify studies that administered CBT to individuals with eating disorders. Full-texts of these articles were read to see whether full inclusion criteria were met. All studies that met inclusion criteria were again screened to determine eligibility for the meta-analysis. Eighty-six studies met full inclusion criteria, and 79 studies were included in the meta-analysis. An effect size could not be calculated from five studies as insufficient data were reported and further data could not be obtained (Channon, de Silva, Hemsley, & Perkins, 1989; Fairburn, Kirk, O'Connor, & Cooper, 1986; Freeman, Sinclair, Turnbull, & Annandale, 1985; Serfaty, Turkington, Heap, Ledsham, & Jolley, 1999) and two studies did not assess an outcome relevant to the current meta-analysis (Bhatnagar, Wisniewski, Solomon, & Heinberg, 2013; Robinson & Serfaty, 2008).

Quality Assessment

The validity of trials was assessed using four of the criteria of the Cochrane Risk of Bias tool (Higgins & Green, 2011). This risk of bias tool assesses potential sources of biases in RCTs, such as the adequate generation of allocation sequence, the concealment of allocation to treatment conditions, blinding of outcome assessors, and dealing with incomplete data. Dealing with incomplete data was assessed as low risk when ITT analyses were conducted. The two other criteria of the Cochrane Collaboration tool were not used; there was no indication that there were selective outcome reporting or other potential sources of bias, consistent with previous systematic reviews (Cuijpers, Cristea, Weitz, Gentili, & Berking, 2016; Hay, 2013). The first author and an independent research assistant performed

the quality assessment. Assessments were cross-checked, and any disagreement was discussed in detail.

Meta-Analysis

We compared CBT to (1) inactive comparisons, which included wait-list or treatment as usual (TAU) conditions¹, (2) active psychological comparisons, which included any other psychotherapy condition; and (3) pharmacological comparisons (any medication). If a study compared CBT to multiple conditions that fell within the same comparison category (two active psychological comparisons), then the sample size of the CBT condition was halved to avoid double counting (Borenstein, Hedges, Higgins, & Rothstein, 2009). Analyses were performed at post-treatment, short-term follow-up (< 12 months) and long-term follow-up (\geq 12 months), unless otherwise indicated. Analyses were performed separately for AN, BN, and BED studies. However, eight trials studied a transdiagnostic sample. For each of these, we determined the diagnosis that occurred most frequently in the sample, and included that study in one of the BN or BED analyses mentioned above. Note that none of these eight transdiagnostic trials were included in the AN analyses.

For continuous outcomes (see outcomes below), Cohen's d was initially calculated by dividing the difference between the post-treatment CBT group mean and the post-treatment comparison group mean by the pooled standard deviation (Borenstein et al., 2009). If means and standard deviations were not reported, d was calculated using conversion equations from significance test statistics. To correct for biases due to small sample size, d was converted to Hedges' g . To calculate a pooled effect size, each study's overall effect size was weighted by its inverse variance. Positive g 's indicates that the CBT condition scored better on a particular

¹ Since participants who are assigned to a wait-list condition typically receive some form of TAU, we merged studies that used a wait-list with studies that used a TAU condition for this comparison.

outcome than the comparison. Small (0.2), medium (0.5) and large (0.8) effects were specified.

For binary outcomes (remission rates), we calculated the odds ratio (OR) and 95% confidence intervals (CI). The OR is a measure of the effect size that is defined as the ratio of the odds of an event (remission) occurring in the CBT group to the ratio of the event in the comparison group another group. An OR of 1 indicates that the event is equally likely in both conditions. Effect sizes were coded so that ORs greater than 1 indicate that remission was significantly more likely in the CBT group. A small (1.68), medium (3.47) and large (6.71) OR was specified.

Primary outcomes included (1) *remission from binge eating and/or purging* (i.e., cessation of binge eating and/or purging in the last 28 days), (2) *binge/purge frequencies* (i.e., the number of objective binge eating and/or purging episodes over the past 28 days), and (3) *global cognitive symptoms*. For the global cognitive symptoms outcome, we prioritised and selected the interviewer-based or self-report version of the Eating Disorder Examination (Fairburn & Beglin, 1994) global score when reported. However, if studies reported multiple subscales from the EDE (or EDE-Q) or subscales from other measures that assess cognitive symptoms (e.g., EDI), we computed separate effect sizes for each subscale and averaged them to create one overall, omnibus cognitive symptoms effect size.

There were instances where a study reported multiple dependent measures for one of the outcome categories listed above. For example, studies often reported *both* binge eating and purging. In such cases, an aggregated effect size for the study was computed from the mean of the individual effect sizes and the pooled variance, assuming the most conservative correlation ($r = 1.0$) between the outcomes (Tolin, 2010).

Heterogeneity

Pooled effect sizes were calculated using the Comprehensive Meta-analysis program (Borenstein et al., 2009). Since we expected considerable heterogeneity among the studies, a random effects model was used for all analyses. Heterogeneity was assessed through the I^2 statistic. The I^2 statistic assesses the degree of heterogeneity, where a value of 0% indicates no observed heterogeneity, 25% low heterogeneity, 50% moderate heterogeneity, and 75% as high heterogeneity (Higgins & Thompson, 2002).

Subgroup Analyses

For the subgroup analyses, a pooled effect size was calculated for each subgroup, and a test was conducted to determine whether the effect sizes for subgroups differed significantly from each other. A mixed effects model was used, which pools studies within a subgroup using a random effects model, but tests for differences between subgroups using a fixed effects model (Borenstein et al., 2009). Significant differences between subgroups are tested by the Q_{between} statistic. Subgroup analyses were conducted for the following characteristics.

- *Sample age*: Adult or adolescent (≤ 18 years) sample.
- *Therapist-led CBT format*: Individual face to face or group face to face,
- *Therapist-led CBT type*: Fairburn and colleagues' CBT-BN or CBT-E; adaptations/abbreviated versions of CBT-BN, or other cognitive-behavioural protocols or approaches (see Supplementary Table 2). Adapted or abbreviated versions of CBT-BN were coded together when (a) shorter versions of the original treatment were delivered, (b) additional cognitive and/or behavioural strategies were incorporated within the original protocol, or (c) strategies from the original CBT-BN or CBT-E manual were removed.
- *Specific therapist-led manualized CBT type*: Manualized CBT-BN or manualized CBT-E.

- *Self-help format:* Face to face guided self-help, computerised guided self-help, or pure self-help.

Results

Anorexia Nervosa Trials

Study characteristics. The characteristics of all included studies are presented in Table 2 in the Supplementary Materials. Seven studies delivered CBT for AN. None of the trials included severely underweight individuals with AN ($BMI \leq 14.5$). All seven studies compared individual, therapist-led CBT to an active comparison intervention. Two trials delivered CBT-E. The active comparisons included behavioural family therapy, cognitive remediation therapy, interpersonal psychotherapy, specialist supportive clinical management, dietary counselling, focal psychodynamic therapy, and Maudsley model of therapy.

The quality of included studies varied. Five trials reported an adequate sequence generation, three trial reported adequate allocation concealment, four trials reported blinding of outcome assessment or used self-report questionnaires, and six trials conducted ITT analyses. Three trials met all four quality criteria, one trial met three criteria, one trial met two criteria, one trial met one of the criteria, and one trial met none of the four criteria. Please see Table 2 in the supplementary materials for domain ratings for each trial.

Therapist-led CBT for AN.

CBT vs. Inactive comparisons. No studies contributed to this comparison.

CBT vs. Active comparisons. There was no statistically significant post-treatment difference in cognitive symptoms between CBT and active comparison treatments. Table 1 presents the results from this meta-analysis. There were also no significant differences at short and long-term follow-up. Table 2 presents the results from these analyses at follow-up. No studies examined binge/purge frequency or remission rates.

CBT vs. pharmacotherapy comparisons. No studies contributed to this comparison.

Bulimia Nervosa Trials

Study Characteristics. There were 37 studies that delivered CBT to individuals with BN. Twenty-eight studies delivered therapist-led CBT—six in group format and 22 in individual format. Face to face ($k=6$) and computerised ($k=2$) guided self-help, and pure self-help ($k=1$) was delivered less often. Fourteen studies compared CBT to an inactive comparison, 26 studies compared CBT to an active comparison (see Supplementary Table 2), and five compared CBT to a pharmacological (all antidepressants) comparison.

Twenty-two studies reported an adequate sequence generation, only 11 trials reported adequate allocation concealment, 32 trials reported blinding of outcome assessment or used self-report questionnaires, and 20 trials conducted ITT analyses. Only eight trials met all four quality criteria, nine trials met three criteria, seven trials met two criteria, 12 trials met one of the criteria, and one trial met none of the quality criteria. Please see Table 2 in the supplementary materials for domain ratings for each trial.

Therapist-led CBT (post-treatment). Table 1 present the main results from each meta-analysis comparing therapist-led and self-help CBT for BN and BED to inactive, active, and pharmacological comparisons. The number of comparisons, the pooled effect size and 95% confidence interval, and the degree of heterogeneity is presented in this table. Statistically significant effect sizes are highlighted in bold.

As can be seen in Table 1, therapist-led CBT for individuals with BN was significantly more efficacious than inactive and active comparisons at post-treatment on all three outcomes. Effect sizes and the degree of heterogeneity ranged from small to large.

There was no evidence suggesting that therapist-led CBT for BN was significantly more efficacious than antidepressants at post-treatment.

Subgroup analyses. A series of subgroup analyses were performed for the comparison between CBT and *inactive* conditions at post-treatment. The results of these subgroup analyses can be seen in Table 3. CBT format (group or individual) and CBT type (CBT-BN variant or “other”) did not moderate any effects at post-treatment (see Table 2).

Subgroup analyses were also performed for the comparison between CBT and *active* conditions at post-treatment (Table 3). Only two moderation effects were observed: Studies that delivered manualized CBT-BN or CBT-E produced significantly larger effect sizes on cognitive symptoms than studies that delivered either a variant of CBT-BN or an alternative protocol. Additionally, studies that delivered CBT for BN in *adults* produced significantly higher remission rates than studies that delivered CBT for BN in *adolescents*.

Consistent trends *within* study subgroups were also found for the CBT versus active comparisons. In particular, therapist-led CBT was significantly superior to active comparisons on all outcomes *only* when full CBT-BN or CBT-E was delivered—the effect sizes for studies that delivered adapted versions of CBT-BN or alternative protocols were not statistically significant across each outcome. The same trends were observed for sample age; CBT was significantly superior to active comparisons *only* in adults. The effect sizes for adolescents were non-significant, though few studies contributed to this subgroup (Table 3).

Follow-up findings. Table 2 presents the results from the meta-analyses for the three main comparisons at short and long-term follow-up for individuals with BN. As shown, only one study contributed to the analyses comparing CBT to inactive and pharmacotherapy, and no differences were reported. However, there was evidence that CBT for BN was significantly more efficacious than *active* comparisons on behavioural, but not cognitive, symptoms at follow-up periods.

CBT self-help for BN. Table 1 presents the meta-analyses comparing CBT self-help for BN to inactive and active comparisons. With moderate effect sizes, self-help CBT for BN was significantly more efficacious than inactive comparisons on remission rates and cognitive symptoms. It was not possible to perform meta-analyses comparing self-help CBT for BN to an active or pharmacological comparison.

Binge Eating Disorder Trials

Study characteristics. There were 35 studies that delivered CBT to individuals with BED. Twenty-one studies delivered therapist-led CBT: 16 in group format and five in individual format. Face to face ($k=11$) and computerised ($k=4$) guided self-help, and pure self-help ($k=3$) were delivered less often². Twenty-two studies compared CBT to an inactive comparison, 10 studies compared CBT to an active comparison, and three compared CBT to a pharmacological comparison (see Supplementary Table 2).

Twenty-three studies reported an adequate sequence generation, only five trials reported adequate allocation concealment, 30 trials reported blinding of outcome assessment or used self-report questionnaires, and 26 trials conducted ITT analyses. Four trials met all four quality criteria, 12 trials met two criteria, and seven trials met one of the criteria. Please see Table 2 in the supplementary materials for domain ratings for each trial.

Therapist-led CBT (post-treatment). As can be seen in Table 1, therapist-led CBT for BED was significantly more efficacious than *inactive* comparisons on remission rates and binge/purge frequencies (large effect sizes), significantly more efficacious than *active* comparisons on binge/purge frequencies and cognitive symptoms (small effect sizes), and significantly more efficacious than *pharmacotherapy* on cognitive symptoms (large effect size).

² Note that many trials included multiple conditions of different CBT modalities.

Subgroup analyses. Subgroup analyses were performed for the comparisons of CBT to inactive and active conditions (Table 4). Only one moderation effect occurred; studies that delivered an alternative CBT protocol produced a significantly larger effect size on cognitive symptoms than studies that delivered an abbreviated version of CBT-BN.

Follow-up findings. Table 3 presents the results of CBT for BED at follow-up. Only one study contributed to the analyses comparing CBT to inactive conditions, and this study showed a benefit of CBT over pharmacotherapy on binge eating frequency. While therapist-led CBT for BED was equally efficacious to active comparisons at follow-up, therapist-led CBT showed a clear benefit over pharmacotherapy at long-term follow-up.

Self-help CBT for BED (post-treatment). Table 1 also presents the meta-analyses comparing CBT self-help for BED to inactive and active comparisons. As shown, self-help CBT for BED was significantly more efficacious than *inactive* comparisons on all outcomes (with moderate effect sizes), but was not more efficacious than *active* comparisons. Analyses comparing self-help to pharmacotherapy were not performed, as only one trial compared these treatments.

Follow-up. Analyses comparing self-help CBT for BED to *inactive* comparisons were performed at follow-up. Follow-up analyses comparing self-help CBT for BED to *active* and *pharmacological* comparisons were not performed, as too few studies provided these data. Given the limited number of studies providing follow-up data, we analysed the last reported follow-up only.

CBT self-help for BED was significantly more efficacious than *inactive* controls at follow-up on remission rates ($N_{\text{comp}} = 5$, OR= 2.81, 95% CI [1.76, 4.49], $I^2 = 0\%$). Of these, the mean effect size for the subgroup that delivered *face to face* guided self-help (OR = 2.87, 95% CI [1.68, 4.99]) was statistically significant, while the mean effect size for the studies that delivered guided self-help over the *computer* was non-significant (OR= 2.63, 95% CI

[0.99, 6.90]). CBT self-help for BED was also significantly more efficacious than *inactive* controls at follow-up on cognitive symptoms ($N_{\text{comp}} = 4$, $g = 0.39$, 95% CI [0.14, 0.63], $I^2 = 66\%$). Of these studies, three delivered *face to face* guided self-help, and the mean effect size for this subgroup was statistically significant ($g = 0.51$, 95% CI [0.36, 0.63]). Follow-up analyses for binge frequencies were not performed given the limited available data.

Direct Comparisons

A series of analyses comparing any type of CBT to specific alternative psychological treatments were performed at post-treatment and follow-up. Given the limited number of studies directly comparing CBT with these specific psychological treatments, we took a transdiagnostic perspective and included all diagnoses into these analyses. The number of comparisons and pooled effect sizes for these comparisons can be seen in Table 5.

CBT vs. interpersonal psychotherapy. Seven studies compared CBT to interpersonal psychotherapy (Agras, Walsh, Fairburn, Wilson, & Kraemer, 2000; Fairburn et al., 2015; Fairburn et al., 1991; McIntosh et al., 2005; Wilfley et al., 1993; Wilfley et al., 2002; Wilson, Wilfley, Agras, & Bryson, 2010). Six delivered therapist-led CBT and one delivered CBT guided self-help. Three studies sampled BN, three sampled BED, and one study sampled AN. Findings show CBT had a significantly larger effect at post-treatment on binge/purge frequencies and cognitive symptoms than interpersonal psychotherapy. Given that there was a trend favouring CBT on remission rates ($p = .130$), we performed an analysis in which we removed the CBT self-help trial. Therapist-led CBT was significantly more efficacious than interpersonal psychotherapy on remission rates (OR = 2.05, 95% CI [1.07, 3.93]). At follow-up, CBT was only more efficacious than IPT on cognitive symptoms.

CBT vs. behaviour therapy. Eight studies compared CBT to behaviour therapy (Cooper & Steere, 1995; Fairburn et al., 1991; Freeman, Barry, Dunkeld-Turnbull, & Henderson, 1988; Griffiths, Hadzi-Pavlovic, & Channon-Little, 1994; Grilo & Masheb, 2005;

Nauta, Hospers, Kok, & Jansen, 2000; Thackwray, Smith, Bodfish, & Meyers, 1993; Wolf & Crowther, 1992). All eight studies delivered therapist-led CBT for BN. At post-treatment, there was no significant difference between CBT and behaviour therapy on any outcome. At follow-up, however, CBT produced significantly greater rates of remission than behaviour therapy

CBT vs behavioural weight loss. Five studies compared CBT to behavioural weight loss (Agras et al., 1994; Grilo & Masheb, 2005; Grilo, Masheb, Wilson, Gueorguieva, & White, 2011; Munsch et al., 2007; Wilson et al., 2010). All five studies sampled individuals with BED with comorbid overweight obesity—two delivered therapist-led CBT and three delivered guided self-help. CBT was significantly more efficacious than behavioural weight loss at post-treatment and follow-up on binge/purge frequencies. No other differences were observed. We also conducted a meta-analysis examining group BMI differences. Although BMI was lower in BWL, the differences at post-treatment ($g = -0.26$, 95% CI [-0.56, 0.05]) and follow-up ($g = -0.13$, 95% CI [-0.35, 0.09]) were not significant.

CBT vs non-specific supportive therapy. Six studies compared CBT to a non-specific supportive therapy (Carter et al., 2003; Freeman et al., 1988; Garner et al., 1993; Kenardy, Mensch, Bowen, Green, & Walton, 2002; Thackwray et al., 1993; Walsh et al., 1997). Five sampled BN and one sampled BED. Five delivered therapist-led CBT and one delivered CBT guided self-help. No statistically significant differences were observed between these two treatments at post-treatment.

Discussion

Summary of Findings

The efficacy of CBT for eating disorders was supported in the current meta-analysis. Therapist-led CBT for BN and BED was consistently more efficacious than inactive control

conditions at reducing behavioural and cognitive symptoms. Critically, improvements in core behavioural symptoms were sustained at follow-up periods, suggesting that CBT has an enduring effect beyond the end of treatment. In addition, CBT delivered in a guided self-help format was also consistently more efficacious than inactive comparisons at reducing behavioural and cognitive symptoms in BN and BED. The fact that CBT guided self-help was shown to be an efficacious treatment for this population supports recommendations that CBT guided self-help be offered as a first-step for treating BN and BED (Hay et al., 2014; National Institute of Clinical Excellence, 2017).

We also compared therapist-led CBT to active control conditions (any other psychotherapy approach). Therapist-led CBT was shown to be more efficacious than active comparisons at reducing behavioural and cognitive symptoms in individuals with BN and BED. Critically, however, few studies contributed to the analyses at follow-up, which highlights the need for future RCTs to assess the long-term impact of CBT. Moreover, we found no evidence to suggest that CBT was significantly more efficacious than active psychological comparisons in individuals with AN. This was the first study to meta-analyse *all* available RCTs that have delivered CBT to individuals with AN, and no evidence was found to support the superiority of any psychotherapy over others (Byrne et al., 2017).

Which Version of CBT?

A noteworthy finding was that when therapist-led CBT for BN was compared with active controls, statistically significant effect sizes were *only* observed for studies that delivered manualized CBT-BN or CBT-E as described. These findings indicate that the superiority of CBT over other psychological treatments is only achieved when the techniques, session structure, and theoretical model outlined in the manual developed by Fairburn and colleagues are implemented. There are several possible explanations for this finding. First, this manualized protocol is based on an extensively validated cognitive-behavioural model

that outlines the eating disorder maintaining mechanisms. These manualized treatments list specific strategies designed to target these mechanisms, and the success of treatment is hypothesised to depend on how well these mechanisms are targeted. Indeed, targeting these mechanisms is crucial for success; greater reductions in these maintaining mechanisms are linked to better outcomes (Linardon, Brennan, & de la Piedad Garcia, 2016; Linardon, de la Piedad Garcia, & Brennan, 2016), and studies that have removed key CBT-BN components designed to eliminate these mechanisms have reported poor outcomes and high rates of relapse (Cooper & Steere, 1995; Fairburn et al., 1991). Another possible reason for the superiority of these manualized protocols may be attributed to higher therapist quality. Trials that delivered CBT-BN or CBT-E were much more likely to audit treatment sessions, assess treatment fidelity and adherence, and report the use of frequent supervision. This idea is consistent with research in depression and anxiety treatment, where a robust relationship between better treatment outcomes and higher quality training/supervision and therapist adherence has been reported (Ginzburg et al., 2012). Although it is assumed that CBT-E is more effective than CBT-BN, we found no differences in effect sizes between these two protocols. To make stronger conclusions about the relative effects of these CBT protocols, additional RCTs that directly compare CBT-BN and CBT-E are required.

CBT versus Dismantled Behavioural Treatments

Our meta-analysis found CBT for BN to be equally efficacious to dismantled behavioural treatments post-treatment, although there was preliminary evidence suggesting that CBT was superior at follow-up. Previous researchers have questioned the benefit of adding complex cognitive interventions to simpler behavioural treatments to achieve therapeutic change for psychological disorders (Dobson & Khatri, 2000). However, since cognitive mechanisms are considered central to the maintenance of eating disorders, advocates of CBT argue that specific treatment strategies that are designed to target these

cognitive mechanisms are critical for therapeutic change (Fairburn, 2008). Despite this argument, the available data does suggest that similar behavioural treatments can lead to improvements similar to CBT. Clearly more trials comparing these treatments are needed to clarify this effect. If behaviour therapy is indeed as effective as complex CBT protocols, dissemination of evidence-based treatments could be greatly improved, as behaviour therapy is proposed to be simpler to learn and requires less skilled, trained, and supervised clinicians.

The Role of Pharmacotherapy

CBT for BN and BED was also compared to pharmacological interventions (antidepressants in all but one case). CBT and pharmacotherapy was equally efficacious at post-treatment in BN and BED. This finding echoes previous research demonstrating that pharmacological therapy, particularly antidepressant medication, has a strong short-term anti-bulimic effect (Brownley et al., 2016). At follow-up, however, CBT was more efficacious than pharmacotherapy only for individuals with BED. All included pharmacotherapy studies discontinued medication use immediately after the treatment phase of the study. This indicates that, unlike the durable effects of CBT, where improvements seem to be sustained after treatment ends, BED symptoms do not seem to be sustained following the discontinuation of medication. This result is consistent with a recent meta-analysis on treatment for adult depression (Cuijpers et al., 2013), which found that while CBT was superior to pharmacotherapy at 12 month follow-up in studies that discontinued medication at post-treatment, CBT and pharmacotherapy were equally efficacious in studies that continued medication use throughout follow-up. Overall, however, the data suggest that the use of pharmacotherapy alone is not recommended in terms of producing long-term change.

CBT versus Other Psychological Interventions

A novel aspect of this meta-analysis was that we compared CBT directly to other specific psychological interventions. CBT was compared with interpersonal psychotherapy,

and although CBT was superior to interpersonal psychotherapy on behavioural symptoms at post-treatment, this difference was not evident at follow-up. Interpersonal psychotherapy takes longer to achieve its effects, and this is thought to be because it targets eating disorder symptoms indirectly. However, we found that this “catch up” effect of interpersonal psychotherapy only applies to behavioural symptoms, as CBT was still significantly superior to interpersonal psychotherapy at follow-up on cognitive symptoms. This finding reinforces the revised NICE guidelines, which recommends CBT over interpersonal psychotherapy as the treatment of choice for eating disorders. Moreover, the fact that CBT outperformed interpersonal psychotherapy demonstrates that CBT has specific mechanisms of change, thereby providing evidence against the common factors model of therapeutic change (Messer & Wampold, 2002).

CBT for BED with overweight/obesity was also compared with behavioural weight loss. CBT was generally superior to behavioural weight loss in the short and long-term at reducing binge eating frequencies. The fact that CBT outperformed behavioural weight loss on binge eating frequency is not unexpected, as behavioural weight loss, unlike CBT, aims to induce one of the core mechanisms hypothesised to maintain binge eating behaviour—dietary restraint. No differences were observed between CBT for BED and behavioural weight loss on cognitive outcomes, suggesting that behavioural weight loss might also have a strong effect on reducing core cognitive symptoms in BED. Unexpectedly, BMI did not differ between the two interventions. Thus, given this lack of observed difference, and given that CBT has a more powerful effect on reducing binge eating than behavioural weight loss, the data suggest that CBT should be prioritized and selected over behavioural weight loss as a treatment approach for overweight individuals with BED.

Finally, CBT was also compared to non-specific supportive therapies. Broadly, non-specific supportive therapy was typically an unstructured therapy without specific

psychological techniques other than those that are common to all approaches (e.g., providing empathy, discussion between client and therapist on experiences and emotions). We found no evidence that CBT was more efficacious than non-specific therapies in individuals with eating disorders. This is similar to what was reported in a recent meta-analysis comparing non-specific supportive therapy to CBT for depression (Cuijpers et al., 2012). However, studies that contributed to the CBT versus non-specific psychotherapy analyses varied. In particular, for this comparison, some studies delivered less intense guided self-help CBT, others delivered group-based CBT, and others delivered individual therapist-led CBT. Critically, only one study in these analyses delivered therapist-led manualized CBT-BN. In this study, Garner et al. (1993) found a clear advantage of CBT-BN over supportive therapy on purge frequencies, dietary restraint, and extreme concerns about shape, suggesting that CBT might be more effective than non-specific therapies *only* when this particular therapist-led CBT protocol is delivered. In sum, while the data may be more in favour of treatment specificity for eating disorders, at present the common factors model cannot yet be conclusively ruled out.

Directions for Future Research

To advance the field on psychological treatments for eating disorders, we offer several recommendations for future research. For AN, more large-scale RCTs evaluating specialist psychological treatments (particularly CBT-E) are needed. Only seven RCTs of CBT for AN were identified, and only one had a sample size large enough to detect statistically significant differences between treatment conditions, assuming a small effect size (Zipfel et al., 2014). The argument that there is no particular psychotherapy for AN that is superior to others may be due to the relatively weak statistical power of available studies. Of course, executing a large sample RCT in this population is challenging, yet large trials of AN are nevertheless underway (Watson & Bulik, 2013)

For BN, a greater understanding of the long-term efficacy of CBT is required. For the few trials that have conducted follow-up assessments, length of assessment has typically been 12 months post-treatment. Relapse in BN, however, is common after this period (Olmsted, Kaplan, & Rockert, 2005). Consequently, the long-term efficacy and durability of CBT for BN is largely unknown. Further, comparing CBT to *continued* antidepressant use at long-term follow-up on symptoms of eating disorders and several indices of health (e.g., quality of life; Linardon & Brennan, 2017) is an important future direction. Such findings could have significant implications for improving the dissemination of cost-effective BN treatments. Finally, to confirm the specificity of psychological treatments for BN, additional trials comparing CBT to a range of other psychological treatments, including interpersonal psychotherapy, non-specific supportive therapy, and the first and third-wave behaviour therapies, are required.

For BED, few trials have directly compared various intensities of CBT (Peterson, Mitchell, Crow, Crosby, & Wonderlich, 2009; Peterson et al., 1998). For instance, while therapist-led CBT for BED was shown to be superior to guided self-help CBT at post-treatment, no differences between modalities were observed at follow-up (Peterson et al., 2009). Comparing distinct cognitive-behavioural treatment modalities should be examined in more trials, particularly since a stepped-care approach is recommended for BED. The stepped-care approach assumes that therapist-led CBT is more effective than guided self-help CBT and should be given priority for those who respond slowly to self-help treatment (NICE, 2017). However, there is insufficient data to definitively conclude that therapist-led CBT is more potent than guided self-help CBT for BED, particularly at longer term follow-up. Clarifying this with larger trials is important. Additionally, demonstrating treatment specificity for BED is also important, so comparing CBT for BED to a range of psychological interventions (e.g., interpersonal psychotherapy, behavioural weight loss) is needed.

Finally, developing empirically supported treatments such as CBT is not the only goal of eating disorder research. Once the efficacy of a treatment is established, the mechanisms through which this treatment exerts its effects, and factors that alter the efficiency of the treatment within certain subgroups should be elucidated. Analysing mediators, moderators, and predictors of response to CBT is one avenue toward improving the effectiveness of CBT for eating disorders, and this should be a research priority (Linardon, Brennan, et al., 2016; Linardon, de la Piedad Garcia, et al., 2016).

Limitations and Conclusions

There are limitations to the current meta-analysis. First, the number of trials was relatively small for many of the comparisons and subgroup analyses. Finding no differences between comparisons when the number of trials is small is not conclusive evidence that there is no meaningful difference present, as the lack of an observed difference may be due to insufficient power. Second, the possibility of publication bias is another limitation. Although we tried to limit the impact of publication bias by searching for and including as many unpublished trials as possible, the possibility that some unpublished trials were missed (and hence inflating effect size estimates) cannot be ruled out. We did not statistically test for publication bias because when the number of studies in an analysis is small, using such statistical methods (e.g., trim and fill method) is not recommended (Hunter et al., 2014). Finally, the quality of included studies was far from optimal; only 15 of 79 trials (19%) met all four criteria for low risk of bias. Therefore, caution should be exercised in interpreting the findings from the current review.

To conclude, the efficacy of therapist-led and guided self-help CBT for BN and BED was supported in the current study. Therapist-led CBT is most efficacious when a manualized version of CBT-BN or its enhanced version is delivered. CBT was no more efficacious than alternative psychotherapies for AN. CBT for eating disorders was equally efficacious to other

specific psychological interventions, most clearly behaviour therapy and non-specific supportive therapy. However, given that few studies contributed to these analyses, and that CBT was shown to clearly outperform an aggregate of active psychological treatments, in addition to interpersonal psychotherapy specifically, the data current favour the specificity of psychological treatment for eating disorders. Given that the quality of included trials was far from optimal, there is more work to be done to ensure future RCTs meet higher standards and can thus offer more useful and robust conclusions.

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³ The supplementary materials provide a reference list of all included trials.

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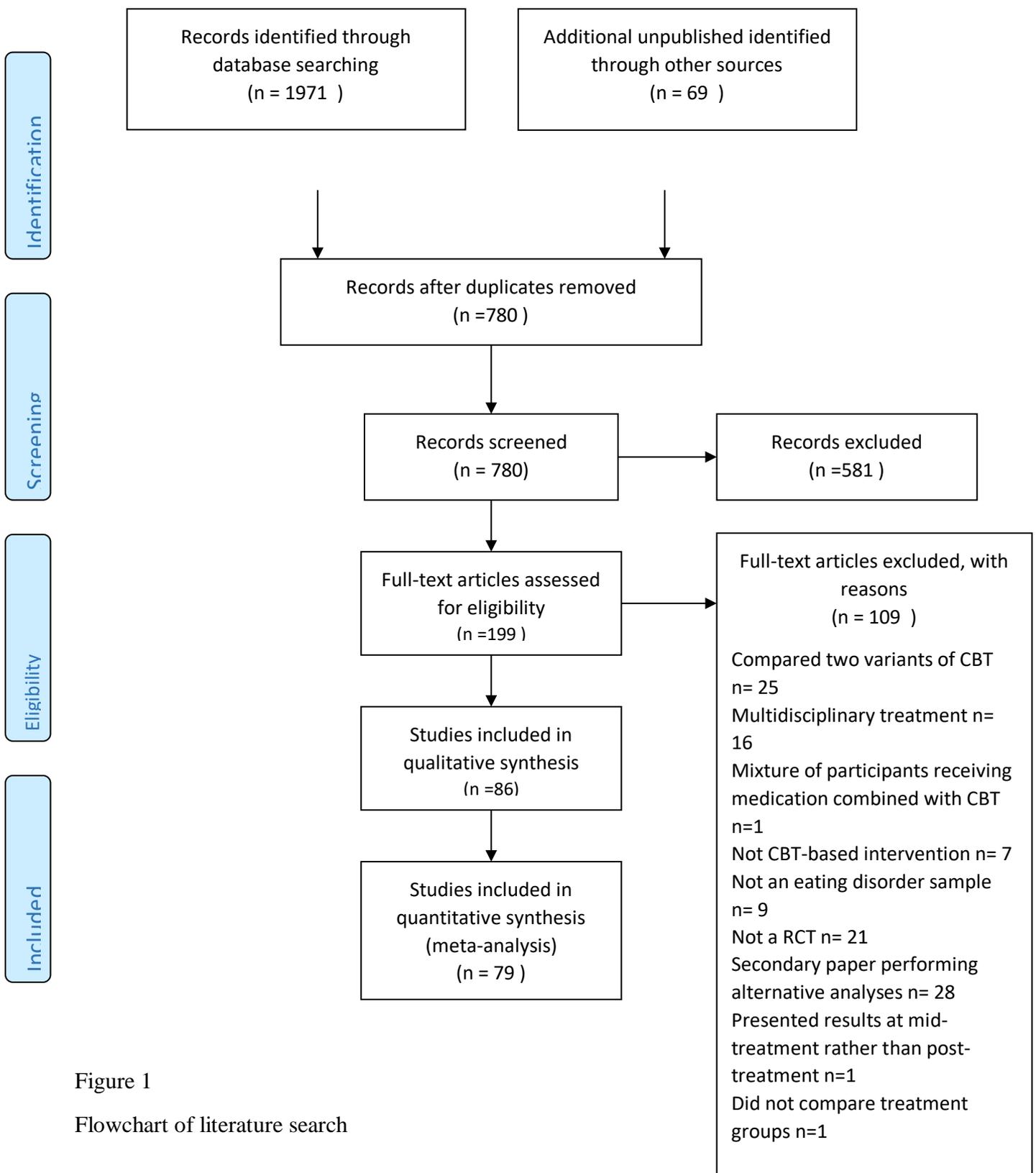


Figure 1

Flowchart of literature search

Table 1
 Primary meta-analyses comparing CBT to inactive, active, and pharmacological comparisons at post-treatment

Comparison	Sample	N _{comp}	Remission		Binge/purge frequencies			Cognitive symptoms		
			OR (95% CI)	I ²	N _{comp}	g (95% CI)	I ²	N _{comp}	g (95% CI)	I ²
Therapist-led CBT vs inactive										
	BN	4	8.89 (2.25, 35.12)	71%	8	0.89 (0.56, 1.22)	66%	8	0.34 [0.11, 0.56]	42%
	BED	7	6.01 (3.13, 11.77)	0%	11	1.13 (0.71, 1.55)	74%	6	0.24 [-0.28, 0.76)	84%
	AN	-	-	-	-	-	-	-	-	-
Therapist-led CBT vs active										
	BN	15	1.49 (1.00, 2.26)	53%	25	0.21 (0.05, 0.36)	68%	18	0.20 (0.01, 0.39)	74%
	BED	5	0.97 (0.61, 1.53)	26%	9	0.18 (0.01, 0.35)	41%	8	0.17 [0.01, 0.33]	0%
	AN	-	-	-	-	-	-	10	0.13 (-0.05, 0.32)	46%
Therapist-led CBT vs pharmacotherapy										
	BN	3	1.99 (0.63, 6.27)	55%	4	0.27 (-0.02, 0.56)	52%	4	0.18 (-0.05, 0.12)	0%
	BED	-	-	-	2	1.61 (-1.07, 4.35)	97%	2	0.73 (0.37, 1.08)	0%
	AN	-	-	-	-	-	-	-	-	-
Self-help CBT vs inactive										
	BN	4	3.44 (2.05, 5.78)	0%	5	0.16 (-0.11, 0.44)	75%	8	0.47 (0.12, 0.82)	92%

Self-help CBT vs active

BED	16	4.82 (3.20, 7.27)	19%	15	0.57 (0.32, 0.82)	64%	13	0.57 (0.31, 0.82)	84%
AN	-	-	-	-	-	-	-	-	-
BN	-	-	-	-	-	-	-	-	-
BED	4	1.45 (0.71, 2.97)	43	4	0.21 (-0.04, 0.45)	0%	5	0.13 (-0.16, 0.41)	57%
AN	-	-	-	-	-	-	-	-	-

Note: There were insufficient studies to perform meta-analyses comparing self-help to pharmacotherapy for BN and BED. BN= bulimia nervosa; BED= binge eating disorder; AN= anorexia nervosa. Bolded indicates statistical significance

	Short-term	1	2.80 (0.12, 63.58)	.517	1	4.11 (2.89, 5.33)	<.001	-	-	
	Long-term	-	-	-	-	-	-	-	-	
CBT vs active										
	Short-term	2	1.54 (0.88, 2.68)	.125	5	0.12 (-0.17, 0.43)	.415	6	0.18 (0.04, 0.30)	.011
	Long-term	4	1.08 (0.72, 1.62)	.686	4	0.14 (-0.13, 0.37)	.363	4	0.01 (-0.17, 0.18)	.951
CBT vs pharmacotherapy										
	Short-term	1	8.66 (0.98, 76.11)	.051	1	0.11 (-0.41, 0.63)	.689	1	0.92 (0.25, 1.59)	.007
	Long-term	1	14.44 (1.69, 122.97)	.015	2	1.15 (-0.88, 3.20)	.266	3	0.99 (0.51, 1.48)	<.001

Note: OR= odds ratio; CI = confidence interval; N_{comp}= number of comparisons; CBT-E = enhanced cognitive-behavioural therapy. Short-term = < 12 months; Long-term = ≥ 12 months; - indicates that there were not enough studies to conduct a meta-analysis. Analyses for AN could only be conducted when CBT was compared with active controls. bolded indicates statistical significance

Table 3
Subgroup analyses across post-treatment outcomes during therapist-led CBT for bulimia nervosa

Subgroup	Remission				Binge/purge frequency				Cognitive symptoms			
	N _{comp}	OR (95% CI)	p	Qbp	N _{comp}	g (95% CI)	p	Qbp	N _{comp}	g (95% CI)	p	Qbp
CBT v inactive												
Format												
Individual	4	8.89 (2.52, 35.12)	.002		4	0.98 (0.52, 1.43)	<.001		4	0.29 (-0.07, 0.69)	.121	
Group	-	-	-		4	0.79 (0.29, 1.29)	.002		2	0.46 (-0.11, 1.04)	.115	
				-				.594				.634
CBT type												
CBT-BN/E	-	-	-		-	-			-	-	-	
Adapted CBT-BN	3	15.00 (1.97, 113.90)	.009		5	1.10 (0.67, 1.53)	<.001		4	0.36 (-0.05, 0.78)	.088	
Other	1	3.35 (0.11, 100.50)	.486		3	0.60 (0.09, 1.14)	.020		3	0.32 (-0.21, 0.86)	.241	
				.458				.114				.900
CBT v active												
Format												
Individual	14	1.48 (0.98, 2.23)	.062		20	0.19 (0.02, 0.37)	.021		16	0.21 (0.01, 0.42)	.041	
Group	1	2.10 (0.15, 28.31)	.574		5	0.24 (-0.13, 0.61)	.200		2	0.11 (-0.51, 0.72)	.745	
				.793				.824				.737

CBT type

CBT-BN/E	7	2.08 (1.23, 3.53)	.006	7	0.42 (0.16, 0.67)	.001	7	0.53 (0.31, 0.74)	<.001
Adapted CBT-BN	7	1.01 (0.58, 1.76)	.950	11	0.04 (-0.18, 0.27)	.710	10	-0.03, (-0.23, 0.16)	.731
Other	1	1.58 (0.35, 7.19)	.548	7	0.21 (-0.09, 0.51)	.174	1	0.08 (-0.56, 0.74)	.793

.183

.099

.001**Specific CBT type**

Full CBT-BN	4	2.37 (0.98, 5.74)	.054	4	0.32 (-0.09, 0.73)	.127	3	0.53 (0.16, 0.89)	.004
Full CBT-E	3	1.78 (0.71, 4.45)	.215	3	0.52 (0.08, 0.96)	.019	4	0.52 (0.21, 0.82)	.001

.657

.506

.979

Age

Adults	14	1.70 (1.21, 2.38)	.002	25	0.23 (0.06, 0.37)	.005	16	0.27 (0.08, 0.45)	.004
Adolescents	1	0.36 (0.12, 1.06)	.065	2	-0.01 (-0.52, 0.49)	.947	2	-0.25, (-0.76, 0.25)	.322

.007

.376

.055

Note: OR= odds ratio; CI = confidence interval; N_{comp}= number of comparisons; Q_{bp}= p value for testing whether subgroups differ significantly from each other; CBT-E = enhanced cognitive-behavioural therapy.

Table 4
Subgroup analyses across post-treatment outcomes during therapist-led CBT for binge eating disorder

Subgroup	Remission				Binge/purge frequency				Cognitive symptoms			
	N _{comp}	OR (95% CI)	p	Qbp	N _{comp}	g (95% CI)	p	Qbp	N _{comp}	g (95% CI)	p	Qbp
CBT v inactive												
Format												
Individual	-	-	-		1	2.04 (0.63, 1.51)	<.001		1	-0.43 (-1.76, 0.90)	.526	
Group	7	6.04 (3.17, 11.72)	<.001		10	1.07 (0.63, 3.44)	.004		5	0.36 (-0.20, 0.92)	.206	
								.197				.282
CBT type												
CBT-BN/E	-	-	-		-	-	-		-	-	-	
Adapted CBT-BN	-	-	-		2	0.75 (-0.42, 1.92)	.209					
Other	7	6.04 (3.17, 11.72)	<.001		9	1.23 (0.74, 1.72)	<.001		6	0.24 (-0.28, 0.76)	.365	
								.462				-
CBT v active												
Format												
Individual	1	0.99 (0.33, 3.02)	.997		2	0.17 (-0.13, 0.46)	.263		2	0.26 (-0.20, 0.73)	.265	
Group	4	0.93 (0.50, 1.74)	.833		6	0.17 (-0.12, 0.46)	.064		7	0.17 (-0.03, 0.37)	.106	
				.919				.974				.706
CBT type												

CBT-BN/E	1	1.31 (0.39, 4.38)	.653	1	0.29 (-0.23, 0.81)	.281	1	0.12 (-0.30, 0.53)	.587
Adapted CBT-BN	2	0.72 (0.31, 1.67)	.452	2	0.11 (-0.16, 0.41)	.431	2	-0.12 (-0.36, 0.13)	.355
Other	2	1.08 (0.42, 2.78)	.863	5	0.19 (-0.01, 0.41)	.066	6	0.27 (0.13, 0.44)	<.001
			.683				.788		.030

Note: OR= odds ratio; CI = confidence interval; N_{comp}= number of comparisons; Q_{bp}= p value for testing whether subgroups differ significantly from each other; CBT-E = enhanced cognitive-behavioural therapy.

Table 5:
Direct comparisons between CBT and alternative psychological treatments at post-treatment and follow-up on primary outcomes

Comparison	Time point	Remission			Binge/purge frequencies			Cognitive symptoms		
		N _{comp}	OR (95% CI)	p	N _{comp}	g (95% CI)	p	N _{comp}	g (95% CI)	p
CBT vs. interpersonal psychotherapy										
	Post	6	1.66 (0.86, 3.23)	.130	6	0.24 (0.01, 0.47)	.044	7	0.32 (0.14, 0.50)	<.001
	Follow-up	4	1.14 (0.75, 1.71)	.530	5	0.06 (-0.07, 0.21)	.348	6	0.16 (0.04, 0.28)	.010
CBT vs. behaviour therapy										
	Post	5	1.54 (0.82, 2.88)	.173	8	0.17 (-0.17, 0.52)	.323	7	0.13 (-0.32, 0.58)	.569
	Follow-up	3	3.34 (1.38, 8.07)	.007	4	0.51 (-0.06, 1.06)	.080	4	0.14 (-0.18, 0.74)	.398
CBT vs. behavioural weight loss										
	Post	4	1.23 (0.57, 2.64)	.605	5	0.30 (0.09, 0.51)	.005	5	0.19 (-0.05, 0.44)	.117
	Follow-up	2	1.45 (0.79, 2.68)	.226	3	0.24 (0.01, 0.46)	.036	3	0.08 (-0.26, 0.44)	.618
CBT vs. non-specific supportive therapy										
	Post	2	2.29 (0.62, 8.44)	.211	6	0.29 (-0.01, 0.61)	.056	4	0.21 (-0.36, 0.79)	.472
	Follow-up	-	-	-	-	-	-	-	-	-

Note: N_{comp}= number of comparisons; OR= Odds ratio; bolded indicates statistical significant

