

The Efficacy of Cognitive Behavioral Therapy: A Review of Meta-analyses

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Abstract Cognitive behavioral therapy (CBT) refers to a popular therapeutic approach that has been applied to a variety of problems. The goal of this review was to provide a comprehensive survey of meta-analyses examining the efficacy of CBT. We identified 269 meta-analytic studies and reviewed of those a representative sample of 106 meta-analyses examining CBT for the following problems: substance use disorder, schizophrenia and other psychotic disorders, depression and dysthymia, bipolar disorder, anxiety disorders, somatoform disorders, eating disorders, insomnia, personality disorders, anger and aggression, criminal behaviors, general stress, distress due to general medical conditions, chronic pain and fatigue, distress related to pregnancy complications and female hormonal conditions. Additional meta-analytic reviews examined the efficacy of CBT for various problems in children and elderly adults. The strongest support exists for CBT of anxiety disorders, somatoform disorders, bulimia, anger control problems, and general stress. Eleven studies compared response rates between CBT and other treatments or control conditions. CBT showed higher response rates than the comparison conditions in seven of these reviews and only one review reported that CBT had lower response rates than comparison treatments. In general, the evidence-base of CBT is very strong. However, additional research is needed to examine the efficacy of CBT for randomized-controlled studies. Moreover, except for children and elderly populations, no meta-analytic studies of CBT have

been reported on specific subgroups, such as ethnic minorities and low income samples.

Keywords CBT · Efficacy · Meta-analyses · Comprehensive review

Introduction

Cognitive-behavioral therapy (CBT) refers to a class of interventions that share the basic premise that mental disorders and psychological distress are maintained by cognitive factors. The core premise of this treatment approach, as pioneered by Beck (1970) and Ellis (1962), holds that maladaptive cognitions contribute to the maintenance of emotional distress and behavioral problems. According to Beck's model, these maladaptive cognitions include general beliefs, or schemas, about the world, the self, and the future, giving rise to specific and automatic thoughts in particular situations. The basic model posits that therapeutic strategies to change these maladaptive cognitions lead to changes in emotional distress and problematic behaviors.

Since these early formulations, a number of disorder-specific CBT protocols have been developed that specifically address various cognitive and behavioral maintenance factors of the various disorders. Although these disorder-specific treatment protocols show considerable differences in some of the specific treatment techniques, they all share the same core model and the general approach to treatment.

Consistent with the medical model of psychiatry, the overall goal of treatment is symptom reduction, improvement in functioning, and remission of the disorder. In order to achieve this goal, the patient becomes an active participant in a collaborative problem-solving process to test and challenge the validity of maladaptive cognitions and to

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modify maladaptive behavioral patterns. Thus, modern CBT refers to a family of interventions that combine a variety of cognitive, behavioral, and emotion-focused techniques (e.g., Hofmann 2011; Hofmann et al. in press). Although these strategies greatly emphasize cognitive factors, physiological, emotional, and behavioral components are also recognized for the role that they play in the maintenance of the disorder.

A recent review of meta-analyses of CBT identified 16 quantitative reviews that included 332 clinical trials covering 16 different disorders or populations (Butler et al. 2006). To our knowledge, this was the first review of meta-analytic studies examining the efficacy of CBT for a number of psychological disorders. This article has since become one of the most influential reviews of CBT. However, the search strategy was restrictive, because only one meta-analysis was selected for each disorder. Furthermore, the search only covered the period up to 2004, but many reviews have been published since then. In fact, the majority of studies (84 %) was published after 2004. The goal of our review was to provide a comprehensive survey of all contemporary meta-analyses examining the evidence base for the efficacy of CBT to date. The meta-analyses included in the present review were all judged to be methodologically sound.

Methods

Search Strategy and Study Selection

To obtain the articles for this review, we searched PubMed, PsychInfo, and Cochrane library databases. Searches were conducted for studies published between the first available year and January 26, 2012 using the following key words: *meta-analysis AND cognitive behav**, *meta-analysis AND cognitive therapy*, *quantitative review AND cognitive behav**, *quantitative review AND cognitive therapy*. This initial search yielded 1,163 hits, of which 355 were duplicates and had to be excluded. The remaining 808 non-duplicate articles were further examined to determine if they met specific inclusionary criteria for the purposes of this review. All included studies had to be quantitative reviews (i.e., meta-analyses) of CBT. In order to limit this review to contemporary studies, only articles published since 2000 were included. The final sample included in this review consisted of 269 meta-analyses (Fig. 1). Out of those, we described a representative sample of 106 meta-analytic studies. The complete reference list for the final sample of included meta-analyses can be obtained by accessing the webpage www.bostonanxiety.org/cbtreview.html. As already noted, the majority (84 %) of these studies was published after 2004, the most recent year covered by

the meta-analysis by Butler et al. (2006). The number of meta-analytic reviews per year is depicted in Fig. 2.

Categorization of Meta-analyses

The 269 meta-analyses were categorized into groups to provide the most meaningful and extensive examination of the efficacy of CBT across a range of problem areas and study populations. The major groupings were the following: substance use disorder, schizophrenia and other psychotic disorders, depression and dysthymia, bipolar disorder, anxiety disorders, somatoform disorders, eating disorders, insomnia, personality disorders, anger and aggression, criminal behaviors, general stress, distress due to general medical conditions, chronic pain and fatigue, pregnancy complications and female hormonal conditions. In addition, some meta-analyses specifically examined CBT for disorders in children and elderly adults. For each disorder and population grouping, data were described qualitatively, considering the findings of all meta-analyses within that group. The 269 meta-analyses included a wide variety of studies that employed different methodologies and effect size estimates. Therefore, we used the designation *small*, *medium*, and *large* for the magnitude of effect sizes in our review of the 106 representative meta-analyses (Cohen 1988). In addition, we provide reported response rates, a widely accepted and common metric in psychiatry, from a subsample of 11 studies that examined the efficacy of CBT in randomized controlled trials.

Results

Addiction and Substance Use Disorder

There was evidence for the efficacy of CBT for cannabis dependence, with evidence for higher efficacy of multi-session CBT versus single session or other briefer interventions, and a lower drop out rate compared to control conditions (Dutra et al. 2008). However, the effect size of CBT was small as compared to other psychosocial interventions (e.g., contingency management, relapse prevention, and motivational approaches) for substance dependence, and agonist treatments showed a greater effect size than CBT in certain drug dependencies, such as opioid and alcohol dependence (Powers et al. 2008b).

Treatments for smoking cessation found that coping skills, which were partially based on CBT techniques, were highly effective in reducing relapse in a community sample of nicotine quitters (Song et al. 2010), and another meta-analysis noted superiority of CBT (either alone or in combination with nicotine replacement therapy) over nicotine replacement therapy alone (García-Vera and Sanz 2006). Furthermore, there was evidence for superior performance of

Fig. 1 Flow diagram showing effects of inclusionary and exclusionary criteria on final sample selection

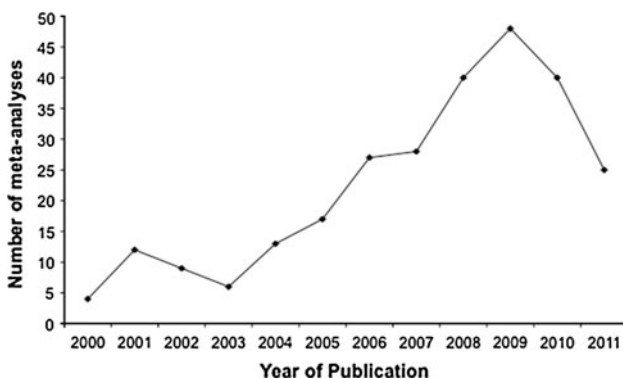
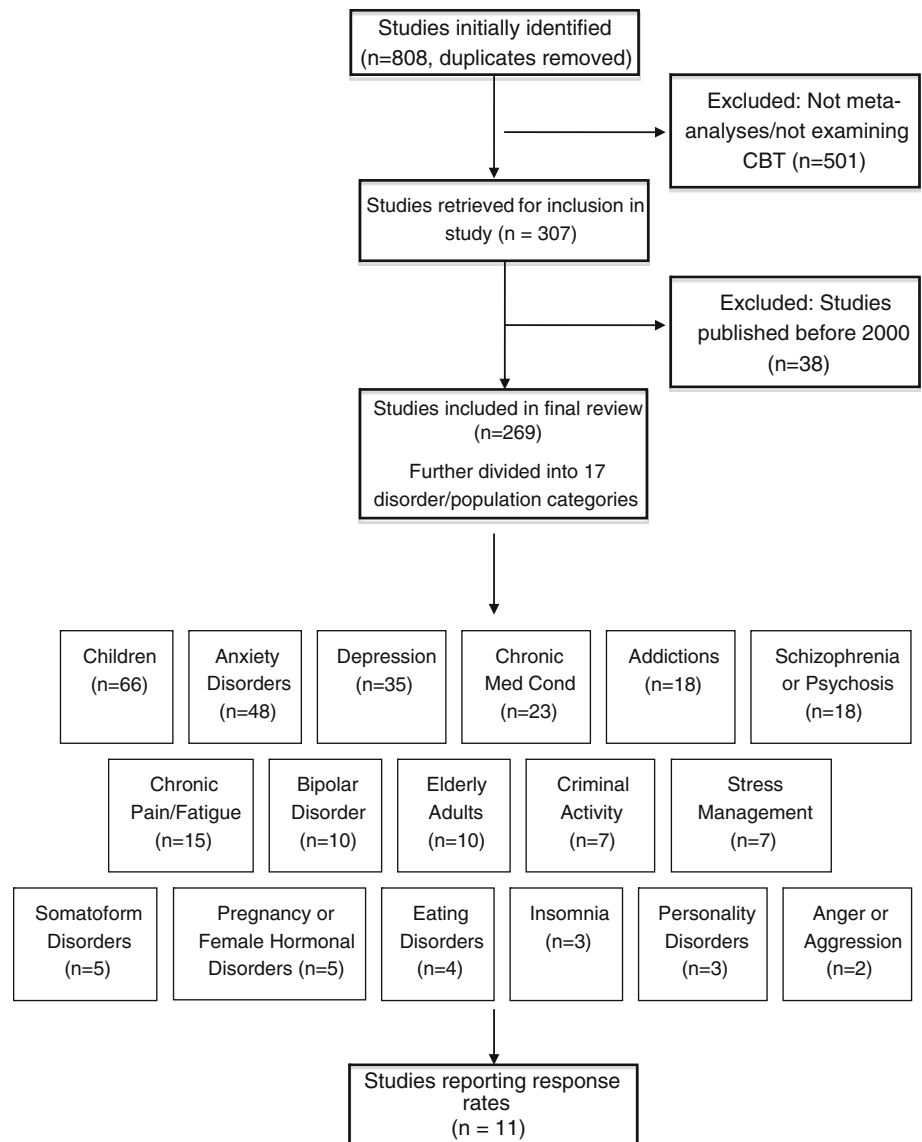


Fig. 2 Number of meta-analyses published by year since 2000. Note that the number of studies corresponding to 2011 only covered studies until September of that year

behavioral approaches in the treatment of problematic gambling as compared to control treatments (Oakley-Browne et al. 2000). One meta-analysis (Leung and Cottler 2009) reported larger effect sizes of CBT when this treatment was grouped with other non-pharmacological treatments (such as brief interventions) as compared to pharmacological agents (e.g., naltrexone, carbamazepine, and topiramate), but CBT was not more efficacious than these other briefer, less expensive approaches.

Schizophrenia and Other Psychotic Disorders

Meta-analyses examining the efficacy of psychological treatments for schizophrenia revealed a beneficial effect of CBT on positive symptoms (i.e., delusions and/or hallucinations).

nations) of schizophrenia (e.g., Gould et al. 2001; Rector and Beck 2001). There was also evidence (e.g., Zimmermann et al. 2005) that CBT is a particularly promising adjunct to pharmacotherapy for schizophrenia patients who suffer from an acute episode of psychosis rather than a more chronic condition.

CBT appeared to have little effect on relapse or hospital admission compared to other interventions, such as early intervention services or family intervention (e.g., Bird et al. 2010; Álvarez-Jiménez et al. 2011). However, CBT had a beneficial effect on secondary outcomes. For example, a more recent meta-analysis by Wykes et al. (2008) examined controlled trials of CBT for schizophrenia and confirmed findings from previous meta-analyses (e.g., Gould et al. 2001; Rector and Beck 2001), suggesting that CBT had a small to medium effect size as compared to control conditions on both positive and negative symptoms. In addition, this meta-analysis revealed medium effect sizes for improvements in secondary outcomes that were not the direct targets of treatment, including general functioning, mood, and social anxiety.

Depression and Dysthymia

CBT for depression was more effective than control conditions such as waiting list or no treatment, with a medium effect size (van Straten et al. 2010; Beltman et al. 2010). However, studies that compared CBT to other active treatments, such as psychodynamic treatment, problem-solving therapy, and interpersonal psychotherapy, found mixed results. Specifically, meta-analyses found CBT to be equally effective in comparison to other psychological treatments (e.g., Beltman et al. 2010; Cuijpers et al. 2010; Pfeiffer et al. 2011). Other studies, however, found favorable results for CBT (e.g., Di Giulio 2010; Jorm et al. 2008; Tolin 2010). For example, Jorm et al. (2008) found CBT to be superior to relaxation techniques at post-treatment. Additionally, Tolin (2010) showed CBT to be superior to psychodynamic therapy at both post-treatment and at 6 months follow-up, although this occurred when depression and anxiety symptoms were examined together.

Compared to pharmacological approaches, CBT and medication treatments had similar effects on chronic depressive symptoms, with effect sizes in the medium-large range (Vos et al. 2004). Other studies indicated that pharmacotherapy could be a useful addition to CBT; specifically, combination therapy of CBT with pharmacotherapy was more effective in comparison to CBT alone (Chan 2006).

Bipolar Disorder

Meta-analyses examining the efficacy of CBT for bipolar disorder revealed small to medium overall effect sizes of

CBT at post-treatment, with effects typically diminishing slightly at follow-up. These findings emerged from examinations of both manic and depressive symptoms associated with bipolar disorder (e.g., Gregory 2010a, b). There is little evidence that CBT as a stand-alone treatment (rather than as an adjunct to pharmacotherapy) is effective for the treatment of bipolar disorder.

In addition to examining CBT for attenuating symptoms of bipolar disorder, some meta-analyses focused on the efficacy of CBT for preventing relapse in bipolar patients. One study (Beynon et al. 2008) examined the efficacy of CBT for preventing relapse and found it to be somewhat effective when comparing CBT versus treatment as usual. Overall, CBT for bipolar disorder was an effective method of preventing or delaying relapses (e.g., Lam et al. 2009; Cakir and Ozerdem 2010). Furthermore, the efficacy of CBT at preventing relapse did not seem to be influenced by the number of previous manic or depressive episodes.

Anxiety Disorders

In general, CBT is a reliable first-line approach for treatment of this class of disorders (Hofmann and Smits 2008), with support for significant positive effects of CBT on secondary symptoms such as sleep dysfunction and anxiety sensitivity (Ghahramanlou 2003). Further, internet-delivered or guided self-help CBT showed some promise in immediate symptom relief as compared to no treatment, but the long-term maintenance with this modality of CBT remains unclear (Öst 2008; Coull and Morris 2011).

CBT for social anxiety disorder evidenced a medium to large effect size at immediate post-treatment as compared to control or waitlist treatments, with significant maintenance and even improvement of gains at follow-up (Gil et al. 2001). Further, exposure, cognitive restructuring, social skills training and both group/individual formats were equally efficacious (Powers et al. 2008a), with superior performance over psychopharmacology in the long term (Fedoroff and Taylor 2001). Similarly, interoceptive exposure for treatment of panic disorder was moderately effective and superior to control/pill placebo treatments and applied relaxation (Haby et al. 2006; Furukawa et al. 2007). For panic disorder without agoraphobia, combination treatment of CBT and applied relaxation was equal in efficacy to use of either therapy approach alone, and use of either or both were superior to use of medications (Mitte 2005).

Various CBT techniques for specific phobia (systematic desensitization, exposure, cognitive therapy) were as effective as applied relaxation and applied tension, producing effect sizes in the large range, with long-term maintenance of gains (Ruhmland and Margraf 2001). For generalized anxiety disorder, CBT was superior as compared to control or pill

placebo conditions, and equally efficacious as relaxation therapy, supportive therapy, or psychopharmacology, but less efficacious in comparison to attention placebos and in those with more severe generalized anxiety disorder symptoms.

CBT for post-traumatic stress disorder was equal in efficacy to eye movement desensitization and reprocessing (Bisson et al. 2007), with both being superior to treatment as usual, waitlist, or other treatments (such as supportive counseling) for post-traumatic stress disorder (Bisson and Andrew 2008). However, it is questionable whether the eye-movement technique is an active treatment ingredient.

Clinical trials also revealed a large effect size for CBT and/or exposure response prevention for obsessive compulsive disorder, with evidence suggesting that a combination of in vivo and imaginal exposures outperformed the use of only in vivo exposures (Ruhmland and Margraf 2001). Furthermore, CBT was found to be similarly efficacious than clomipramine and selective reuptake inhibitors (Eddy et al. 2004).

Somatoform Disorders

Within the somatoform disorders category of DSM-IV, meta-analyses primarily examined the efficacy of psychological interventions for hypochondriasis and body dysmorphic disorder. One meta-analysis found a large mean effect size for CBT, which outperformed other psychological treatments (i.e., psychoeducation, explanatory therapy, cognitive therapy, exposure and response prevention, and behavioral stress management), with effect sizes in the large range, as well as pharmacotherapy treatments (paroxetine, fluoxetine, fluvoxamine, and nefazodone), which also evidenced large effect sizes (Taylor et al. 2005). The mean effect size for control conditions (e.g., wait-list control) was small. These results were partially supported by other evidence, as a more recent meta-analysis found superior outcomes of CBT for hypochondriasis compared to waiting list control, usual medical care or placebo at 12-months follow-up (Thomson and Page 2007). However, this meta-analysis also found no differences between CBT and waiting list/placebo at post-treatment.

Meta-analyses comparing the efficacy of CBT to control treatments found that CBT was superior in significantly reducing body dysmorphic disorder symptoms (Ipser et al. 2009). In comparing relative efficacy of CBT versus pharmacotherapy, effect sizes were large on body dysmorphic disorder severity measures for CBT, and ranged from medium to large for pharmacotherapy (Williams et al. 2006). In addition, another meta-analysis found that CBT for body image disturbances was effective, with effect sizes ranging from medium to large (Jarry and Ip 2005).

Eating Disorders

For bulimia nervosa, meta-analyses compared the efficacy of CBT to control treatments and found effect sizes in the medium range (Thompson-Brenner 2003). However, the effect of behavior therapy was greater than that of CBT, with the average effect size for behavior therapy in the large range (Thompson-Brenner 2003). Another meta-analysis comparing CBT with control treatments found remission response rates to be higher for CBT, with a medium relative risk ratio (Hay et al. 2009). When comparing CBT to other psychotherapies, specifically, interpersonal therapy, dialectical behavioral therapy, hypno-behavioral therapy, supportive psychotherapy, behavioral weight loss treatment, and self-monitoring, CBT fared significantly better in remission response rates for bulimia nervosa, with a large relative risk ratio (Hay et al. 2009).

For binge eating disorder, a recent meta-analysis found that psychotherapy and structured self-help yielded large effect sizes, when compared to pharmacotherapy, which yielded medium effect sizes (Vocks et al. 2010). Although this study did not parse out the efficacy of CBT specifically, a majority of the included trials for psychotherapy involved CBT (19 out of 23 trials). Furthermore, a review and meta-analysis by Reas and Grilo (2008) suggested that combination treatment of psychotherapy and medications did not enhance binge-eating outcomes, but may have enhanced weight loss outcomes.

Insomnia

CBT for insomnia (CBT-I) has long been shown to be more efficacious than control treatments. A recent meta-analysis examined its efficacy on both subjective and objective sleep parameters in comparison to a control group for individuals with primary insomnia (Okajima et al. 2011). Effect sizes for the efficacy of CBT-I versus control at the end of treatment on subjective sleep measures, which included sleep onset latency, total sleep time, wake after sleep onset, total wake time, time in bed, early morning awakening, and sleep efficiency, ranged from minimal (total sleep time) to large (early morning awakening; Okajima et al. 2011). For objective measures using a polysomnogram or actigraphic evaluation, effect sizes ranged from small (total sleep time) to large (total wake time; Okajima et al. 2011). These findings were consistent with results from another meta-analysis, which examined the relative efficacy of behavioral interventions for insomnia including CBT, relaxation, and only behavioral techniques (Irwin et al. 2006). This study reported effect sizes ranging from $-.75$ to 1.47 for CBT, $-.60$ – $.53$ for relaxation techniques, and $-.82$ – $.91$ for only behavioral techniques on subjective sleep outcomes.

Personality Disorders

There was one meta-analysis that examined the relative efficacy of CBT versus psychodynamic therapy for the treatment of personality disorders (Leichsenring and Leibling 2003). The findings indicated a larger overall effect size for psychodynamic therapy compared to CBT. This was consistent with observer-rated measures, which showed a similar pattern of effect sizes: stronger for psychodynamic therapy than for CBT (although this effect size was also large). Self-report measures, however, indicated larger effect sizes for CBT than for psychodynamic therapy.

Another meta-analysis compared the efficacy of eleven different psychological therapies, including CBT, for antisocial personality disorder (Gibbon et al. 2010). Results suggested that compared to control treatment, CBT plus standard maintenance was more efficacious in terms of leaving the study early and cocaine use for outpatients with antisocial personality disorder and comorbid cocaine dependence. However, CBT plus treatment as usual was not better than a control condition for these antisocial personality disorder patients with regard to levels of recent verbal or physical aggression. The relative efficacy of psychological treatments for borderline personality disorder, in particular, was also examined, which yielded no differences between dialectical behavioral therapy and treatment as usual in individuals meeting criteria for borderline personality disorder at 6 months, or in hospital admissions in the previous 3 months (Binks et al. 2006).

Anger and Aggression

Two meta-analytic reviews focused on anger control problems and aggression (Del Vecchio and O'Leary 2004; Saini 2009). The findings from these meta-analyses suggested that CBT is moderately effective at reducing anger problems. Findings from these reviews also suggested that CBT may be most effective for patients with issues regarding anger expression.

CBT produced medium effect sizes as compared to other psychosocial treatments and control conditions across the two reviews that conducted quantitative analyses. A meta-analysis on the effectiveness of anger treatments for specific anger problems (Del Vecchio and O'Leary 2004) included only studies in which subjects met clinically significant levels of anger on standardized anger measurements prior to treatment. This meta-analysis examined the effects of CBT, cognitive therapy, relaxation, and 'other' (e.g., social skills training, process group counseling) on various anger problems including driving anger, anger suppression, and anger expression difficulties.

Criminal Behaviors

Four separate meta-analytic studies supported the efficacy of CBT for criminal offenders (Illescas et al. 2001; Lösel and Schmucker 2005; Pearson et al. 2002; Wilson et al. 2005). Out of several theoretical orientations and types of psychological interventions for criminal activity, behavior therapy and CBT appeared to be the superior interventions in reducing recidivism rates, both with medium mean effect sizes (Illescas et al. 2001). Effect sizes for other interventions ranged from small to medium (Illescas et al. 2001). Another study demonstrated consistent findings with a small weighted mean effect size of behavior therapy or CBT for reducing recidivism (Pearson et al. 2002). Similarly, Wilson et al. (2005) found an overall small-to-medium mean effect size for CBT programs for convicted offenders.

For sexual offenders in particular, physical treatments, such as surgical castration and hormonal treatment, were demonstrated to have greater efficacy in reducing sexual recidivism in comparison to CBT, with large significant odds ratios for both of these alternative interventions (Lösel and Schmucker 2005). Of the various psychological interventions for sexual offenders, however, classical behavioral and CBT approaches indicated the strongest efficacy, with odds ratios in the medium to large range (Lösel and Schmucker 2005) as compared to insight-oriented and therapeutic community interventions.

A study of CBT for domestic violence indicated no differences between CBT and the Duluth model (which is based on a feminist psycho-educational approach) for treating domestically violent males (Babcock et al. 2004). The aggregated data from experimental and quasi-experimental studies showed that CBT had an overall small effect size, and the Duluth model had an overall slightly larger, but still small effect size (Babcock et al. 2004).

General Stress

Four meta-analyses examined occupational stress and the majority of their results were quite similar: CBT interventions were more effective in comparison to other intervention types such as organization focused therapies, especially when CBT focused on psycho-social outcomes in employees (Kim 2007; Richardson and Rothstein 2008; van der Klink et al. 2001). For example, Richardson and Rothstein (2008) found CBT alone to be more effective in comparison to CBT combined with additional psychological components. These studies found a large effect size for overall CBT interventions, large effect size for single-mode CBT interventions, and small effect size for CBT interventions with four or more components. In contrast, Marine et al. (2006) chose not to

compare CBT with other interventions, such as relaxation techniques for psychological stress, because most interventions comprised both elements and could not be evaluated separately. With respect to stress in parents of children with developmental disabilities, positive effects were found for CBT, but the effect size was relatively small (Singer et al. 2007). In contrast to the results of Richardson and Rothstein (2008), this meta-analysis found multiple component interventions which combined CBT, behavioral parent training and in some cases other forms of support services, to have a higher and large effect size in comparison to CBT alone (Singer et al. 2007).

Distress due to General Medical Conditions

Limited well-controlled studies existed in the study of non-ulcer dyspepsia, multiple sclerosis, physical disability following traumatic injury, non-epileptic seizures, post-concussion syndrome, chronic obstructive pulmonary disease, hypertension, Type II diabetes, and burning mouth syndrome (e.g., Soo et al. 2004; Thomas et al. 2006; Baker et al. 2007; Ismail et al. 2004). However, cancer was studied more rigorously and with more robust methodological attention, indicating small to medium effect sizes of individual CBT as compared to patient education only in gynecological and head/neck cancers (Zimmermann and Heinrichs 2006; Luckett et al. 2011), on secondary outcomes such as quality of life, psychological distress (i.e., depression and anxiety), and pain. Further, CBT was shown to be equally effective as exercise interventions in treating cancer-related fatigue (Kangas et al. 2008).

Small to medium effect sizes were observed in treatment of secondary symptoms (anxiety and stress) experienced by individuals who were HIV positive, with particular efficacy (particularly for stress management) in reducing anger symptoms as compared to supportive therapy (Crepaz et al. 2008), but not for outcomes such as low cell count, medication adherence, or when used with marginalized populations such as ethnic minorities and women (Crepaz et al. 2008; Rueda et al. 2006).

CBT was shown to be superior in the treatment of secondary symptoms of spinal cord injury as compared to controls in assertiveness skills, coping, depression and quality of life (Dorstyn et al. 2011), better than placebo or diet/exercise alone (Shaw et al. 2005), but equal to yoga/education in depressive symptoms (Martinez-Devesa et al. 2010). CBT was only slightly more effective than usual care or waitlist condition in the treatment of irritable bowel syndrome, with peppermint oil having greater efficacy in providing relief in this particular disorder (Enck et al. 2010).

Chronic Pain and Fatigue

Meta-analyses examining the efficacy of psychosocial treatments for chronic pain have investigated chronic low back pain, fibromyalgia, rheumatoid arthritis, chronic fatigue syndrome, chronic musculoskeletal pain, and non-specific chest pain. These reviews have examined the effect of a range on treatments on chronic pain, including relaxation techniques, mindfulness-based techniques, acceptance-based techniques, biofeedback, psycho-education, and behavioral and cognitive-behavioral treatments. Results of these meta-analyses revealed varying effect sizes for these treatments depending on the type of chronic pain targeted; however, CBT treatments for chronic pain were consistently in the small to medium effect size range.

Similar results were found in a meta-analysis examining psychological treatments for fibromyalgia (Glombiewski et al. 2010). This meta-analysis revealed that CBT was superior to other psychological treatments for decreasing pain intensity. Pre-post analyses revealed a medium effect size for CBT as compared to a small effect size for all other psychological treatments combined (excluding CBT). CBT treatments for chronic fatigue syndrome were moderately effective (e.g., Malouff et al. 2008; Price et al. 2008). Malouff et al. (2008) conducted a meta-analysis revealing a medium effect size in post-treatment fatigue for participants receiving CBT versus those in control conditions.

Pregnancy Complications and Female Hormonal Conditions

One meta-analysis found CBT to be more effective in comparison to control conditions for perinatal depression (Sokol et al. 2011), and another meta-analysis found beneficial effects of CBT for postnatal depression, but these results need to be interpreted with caution because it is difficult to causally link depression with pregnancy and hormonal changes in these studies (Dennis and Hodnett 2007). Further, Bledsoe and Grote (2006) found greater decreases in depression for women experiencing non-psychotic major depression in pregnancy and postnatal periods treated with combination treatment in comparison to antidepressant medication alone, which was itself more effective in comparison to CBT alone. The effect size for postnatal treatments was large in comparison to the small to medium effects of prenatal treatments, but when pharmacological treatments were excluded, the effect size for postnatal treatments decreased to the medium range.

For the treatment of premenstrual syndrome, Busse et al. (2009) found that CBT significantly reduced depressive and anxiety symptoms associated with this syndrome, as indicated by a medium effect size. Once again, these results need to be interpreted carefully due to the small number of well-controlled studies on which these reviews were based.

CBT for Special Populations

Children

Within internalizing symptoms, there was support for the preferential use of CBT approaches in treatment of anxiety disorders in children and adolescents, with effect sizes in the large range (Santacruz et al. 2002; James et al. 2005). Further, CBT treatment for obsessive compulsive disorder as compared to alternative approaches (no treatment, other psychosocial treatments and medications such as clomipramine and fluvoxamine) resulted in significantly better outcomes (Phillips 2003; Guggisberg 2005). The data supporting CBT for depression was less strong, but still in the medium effect size range across meta-analyses, with maintenance in 6-months follow-up periods (Santacruz et al. 2002). In addition, CBT seemed to work equally well as other psychotherapies (i.e., interpersonal therapy and family systems therapy), but was regarded as superior to selective reuptake inhibitors due to reduced chance of side effects and greater cost effectiveness (Haby et al. 2004). The studies on efficacy of CBT for addressing suicidal behaviors were scarce (Robinson et al. 2011), and warrant further investigation.

The picture was more mixed for other disorders, with CBT showing equal efficacy in reducing disruptive classroom behaviors and aggressive/antisocial behaviors, as other psychosocial treatments, better efficacy as compared to no treatment or treatment as usual, and less efficacy than pharmacological approaches (Lösels and Beelmann 2003; Özabacı 2011). Similarly, CBT for attention deficit hyperactivity disorder showed some efficacy, but was not superior to medications (Van der Oord et al. 2008). The efficacy of behavioral techniques (e.g., motivational enhancement and behavioral contingencies) was small to medium for the treatment of adolescent smoking and substance use as compared to no treatment, but not more so than other psychotherapies. In addition, there was a medium to large effect size of CBT over waitlist across meta-analyses examining chronic headache pain. Finally, the data on efficacy for CBT in juvenile sex offenders, childhood sexual abuse survivors, childhood obesity, fecal incontinence, and juvenile diabetes was limited, showing preliminary support for CBT as compared to no treatment, but equal efficacy to other psychosocial approaches (Walker et al. 2005; Macdonald et al. 2006).

Elderly Adults

With respect to mood disorders, with depression as the most commonly examined disorder, nearly all meta-analyses showed that CBT was more effective than waiting list control conditions, but equally effective in comparison to other active treatment methods, such as reminiscence, (an

intervention that uses recall of past events, feelings and thoughts to facilitate pleasure, quality of life or adaptation to the present; Peng et al. 2009), psychodynamic therapy, and interpersonal therapy (Krishna et al. 2011; Wilson et al. 2008). Pincus et al. (2007), however, found a large effect size for CBT, whereas the effect sizes for the other active treatment conditions were in the medium-large range. When long-term outcomes were examined, results of one meta-analysis indicated that treatment gains of CBT for depression were maintained at 11-months follow-up (Krishna et al. 2011), but long-term follow-up data remained scarce in the other meta-analyses. In a meta-analysis assessing the additive effects of CBT and pharmacological approaches, Peng et al. (2009) found that CBT was more effective in comparison to placebo, but CBT as an adjunct to antidepressant medication did not increase the effectiveness of antidepressants in this population.

For anxiety disorders in the elderly, CBT (alone or augmented with relaxation training) did not enhance outcomes beyond relaxation training alone (Thorp et al. 2009), although many of these studies were uncontrolled. In contrast to the findings by Thorp et al. (2009), Hendriks et al. (2008) found that anxiety symptoms were significantly decreased following CBT than after either a waiting-list control condition or other treatment methods. Additionally, CBT significantly alleviated accompanying symptoms of worry and depression when compared to waiting-list control or an active control condition.

Response Rates of Randomized Controlled Studies

The meta-analytic studies that provided response rates are listed in Table 1. The response rates of CBT varied between 38 % for treating obsessive compulsive disorder (Eddy et al. 2004) and 82 % for treating body dysmorphic disorder (Ipser et al. 2009). In contrast, the response rates of the waitlist groups ranged from 2 % for the treatment of bulimia nervosa (Thompson-Brenner 2003) to 14 % for generalized anxiety disorder (Hunot et al. 2007). CBT also demonstrated higher response rates in comparison to treatment as usual in treatment of generalized anxiety disorder and chronic fatigue (Price et al. 2008), and higher or equal response rates as compared to other therapies or psychopharmacological interventions in most studies. CBT only produced a lower response rate than psychodynamic therapy for the personality disorders (47 vs. 59 %; Leichsenring and Leibling 2003).

Discussion

CBT is arguably the most widely studied form of psychotherapy. We identified 269 meta-analytic reviews that

Table 1 Pooled meta-analytic response rates for CBT versus other conditions across disorders

Disorder	Author (year)	Number of studies	CBT (%)	MED	OT (%)	PBO (%)	TAU (%)	WL (%)	Comparison
Borderline personality disorder	Ipser et al. (2009)	2	82 ^a	56 % ^a		18 ^a			CBT, MED > PBO
Panic disorder	Siev and Chambless (2008)	5	77	–	50	–	–	–	CBT > OT
Anger/aggression	Del Vecchio and O'Leary (2004)	23	66–69	–	65–70	–	–	–	CBT = OT
Depression	Leichsenring (2001)	6	51–87	–	45–70	–	–	–	CBT > OT
Childhood anxiety	James et al. (2005)	13	56	–	–	28 ^b	–	–	CBT > PBO
Chronic fatigue	Malouff et al. (2008)	5	50	–	–	–	–	–	–
Personality disorders	Leichsenring and Leibing (2003)	25	47 ^c	–	59 ^d	–	–	–	CBT < OT
Generalized anxiety disorder	Hunot et al. (2007)	8	46 ^e	–	–	–	14	14	CBT = OT; CBT > TAU,WL
Chronic fatigue	Price et al. (2008)	6	40	–	–	–	26	–	CBT > TAU
Bulimia nervosa	Thompson-Brenner (2003)	26	40–44	–	–	27	–	2	CBT > PBO, WL
Obsessive compulsive disorder	Eddy et al. (2004)	3	38–50	–	–	–	–	–	–

The table shows response rate percentages for CBT (from highest to lowest) compared to each comparison condition for every meta-analytic study reporting such data across disorder groups; –: no data reported; >: higher efficacy; <: lower efficacy; =: equal efficacy. *MED* medication/pharmacological approaches, *OT* other therapies (consisting of relaxation therapy, supportive therapy, or psychodynamic therapy), *PBO* placebo/control treatments, *TAU* treatment as usual, *WL* waitlist treatment, *BDD* body dysmorphic disorder, *PD* panic disorder without agoraphobia, *GAD* generalized anxiety disorder, *OCD* obsessive–compulsive disorder. ^aOne study; ^bHeterogeneous response rate pooling placebo/control, waitlist, and supportive treatment conditions; ^c11 studies; ^d14 studies; ^eResponse rate of OT not reported in paper; stated as being equal to CBT (as indicated in comparison column)

examined CBT for a variety of problems, including substance use disorder, schizophrenia and other psychotic disorders, depression and dysthymia, bipolar disorder, anxiety disorders, somatoform disorders, eating disorders, insomnia, personality disorders, anger and aggression, criminal behaviors, general stress, distress due to general medical conditions, chronic pain and fatigue, distress related to pregnancy complications and female hormonal conditions. Additional meta-analytic reviews examined the efficacy of CBT for various problems in children and elderly adults. The vast majority of studies (84 %) was published after 2004, which was the last year of coverage of the review by Butler et al. (2006), making the present study the most comprehensive and contemporary review of meta-analytic studies of CBT to date.

For the treatment of *addiction* and *substance use disorder*, the effect sizes of CBT ranged from small to medium, depending on the type of the substance of abuse. CBT was highly effective for treating cannabis and nicotine dependence, but less effective for treating opioid and alcohol dependence. For treating *schizophrenia and other psychotic disorders*, the empirical literature suggested appreciable efficacy of CBT particularly for positive symptoms and secondary outcomes in the psychotic disorders, but lesser efficacy than other treatments (e.g.,

family intervention or psychopharmacology) for chronic symptoms or relapse prevention.

The meta-analytic literature on the efficacy of CBT for *depression and dysthymia* was mixed with some studies suggesting strong evidence and others reporting weak support. Some authors have suggested that the strong effects in some studies may be an overestimation due to a publication bias (Cuijpers et al. 2010). Similarly, the efficacy of CBT for *bipolar disorder* was small to medium in the short-term in comparison to treatment as usual. However, there was limited evidence for the superiority of CBT alone over pharmacological approaches; for the treatment of depressive symptoms in bipolar disorder, the use of CBT was well supported. However, the long-term superiority compared to other treatments is still uncertain.

The efficacy of CBT for *anxiety disorders* was consistently strong, despite some notable heterogeneity in the specific anxiety pathology, comparison conditions, follow-up data, and severity level. Large effect sizes were reported for the treatment of obsessive compulsive disorder, and at least medium effect sizes for social anxiety disorder, panic disorder, and post-traumatic stress disorder. Medium to large CBT treatment effects were reported for *somatoform disorders*, such as hypochondriasis and body dysmorphic disorder. However, more studies using larger trials and

greater sample sizes are needed to draw more conclusive findings with regard to CBT's relative efficacy in comparison to other active treatments.

For the treatment of *bulimia*, CBT was considerably more effective than other forms of psychotherapies, but less is known for other eating disorders. Similarly, CBT demonstrated superior efficacy as compared to other interventions for treating *insomnia* when examining sleep quality, total sleep time, waking time, and sleep efficiency outcomes. However, although there were small effects of CBT for sleep problems among older adults (aged 60+), these effects may not be long lasting (Montgomery and Dennis 2009).

For *personality disorders*, there was some evidence for superior efficacy of CBT as compared to other psychosocial treatments for the personality disorders. However, the studies showed considerable variation in measurement methods, comorbid disorders, and demographic variables. CBT also produced medium to large effect sizes for treating *anger and aggression* (e.g., Saini 2009), although a greater number of well-controlled studies are needed to more adequately parse out the specific efficacy of CBT compared to the psychosocial treatments for anger on the whole. Similarly, more studies are needed before any firm conclusions can be drawn about the efficacy of this treatment for *criminal behaviors*.

As a *stress management* intervention, CBT was more effective than other treatments, such as organization-focused therapies. However, more research on the long-term effects of CBT for occupational stress is needed. Furthermore, there are open questions about the relative efficacy of CBT versus pharmacological approaches to stress management. Similarly, several common concerns recurred across meta-analytic examinations of CBT for *chronic medical conditions, chronic fatigue and chronic pain*, namely: (1) a scarcity of studies and small sample sizes; (2) poor methodological design of studies that are included in meta-analyses; and (3) grouping of CBT with a host of other psychotherapies (such as psychodynamic therapy, hypnotherapy, mindfulness, relaxation, and supportive counseling), which made it difficult to parse out whether there are any superior effects of CBT in the majority of medical conditions examined.

There was preliminary evidence for CBT for treating *distress related to pregnancy complications and female hormonal conditions*. However, more research is needed due to a scarcity of follow-up data and low quality studies. This appeared to be a highly promising area for CBT given that the alternative—pharmacological treatments—can be associated with serious risks of adverse effects for pregnant women and breastfeeding mothers.

In our review of meta-analyses, CBT tailored to *children* showed robust support for treating internalizing disorders,

with benefits outweighing pharmacological approaches in mood and anxiety symptoms. The evidence was more mixed for externalizing disorders, chronic pain, or problems following abuse. Moreover, there remains a need for a greater number of high-quality trials in demographically diverse samples. Similarly, CBT was moderately efficacious for the treatment of emotional symptoms in the *elderly*, but no conclusions about long-term outcomes of CBT or combination therapies consisting of CBT, and medication could be made.

Finally, our review identified 11 studies that compared response rates between CBT and other treatments or control conditions. In seven of these reviews, CBT showed higher response rates than the comparison conditions, and in only one review (Leichsenring and Leibing 2003), which was conducted by authors with a psychodynamic orientation, reported that CBT had lower response rates than comparison treatments.

In sum, our review of meta-analytic studies examining the efficacy of CBT demonstrated that this treatment has been used for a wide range of psychological problems. In general, the evidence-base of CBT is very strong, and especially for treating anxiety disorders. However, despite the enormous literature base, there is still a clear need for high-quality studies examining the efficacy of CBT. Furthermore, the efficacy of CBT is questionable for some problems, which suggests that further improvements in CBT strategies are still needed. In addition, many of the meta-analytic studies included studies with small sample sizes or inadequate control groups. Moreover, except for children and elderly populations, no meta-analytic studies of CBT have been reported on particular subgroups, such as ethnic minorities and low income samples.

Despite these weaknesses in some areas, it is clear that the evidence-base of CBT is enormous. Given the high cost-effectiveness of the intervention, it is surprising that many countries, including many developed nations, have not yet adopted CBT as the first-line intervention for mental disorders. A notable exception is the Improving Access to Psychological Therapies initiative by the National Health Commissioning in the United Kingdom (Rachman and Wilson 2008). We believe that it is time that others follow suit.

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