Efficacy of Cognitive Behavioral Therapy for Anxiety Disorders: A Review of Meta-Analytic Findings

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KEYWORDS

• Anxiety disorders • Cognitive behavioral therapy
• Exposure • Meta-analysis

Anxiety disorders are characterized by excessive fear and subsequent avoidance, typically in response to a specified object or situation and in the absence of true danger. Anxiety disorders have the highest overall prevalence rate among psychiatric disorders, with 12-month and lifetime rates of 18.1% and 28.8%, respectively.[1,2] Untreated anxiety also represents a significant economic burden, and associated functional impairments have a substantial negative impact on quality of life.[3,4] Descriptive and experimental research have been instrumental in delineating the structure of anxiety and the core psychosocial and biological mechanisms that contribute to the development and maintenance of these disorders.[5] For example, information-processing studies have shown automatic attentional biases toward threat-relevant stimuli across the anxiety disorders.[6] Conditioning research has also shown that elevated sensitivity to danger and safety cues is characteristic of many anxiety disorders, with resulting avoidance behaviors negatively reinforcing the persistence of the

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anxiety.[7] This combined body of research serves as the foundation for the development of empirically supported treatments for anxiety disorder symptoms.

Cognitive and behavioral interventions are the most widely studied psychological interventions for addressing the information processing biases and avoidance behaviors that are characteristic of the anxiety disorders.[8] Cognitive behavioral therapy (CBT) is a collaborative, structured, skill-building, time-limited, and goal-oriented intervention designed to target core components of a given disorder.[9] Numerous randomized controlled trials have shown that CBT is effective in reducing symptoms of psychopathology, and stronger effects are often reported for the treatment of anxiety disorders relative to other conditions.[10] Meta-analysis is the primary means through which researchers have synthesized the results from multiple treatment trials examining the efficacy of CBT. Although the use of meta-analytic data is not without limitations, this approach has proven useful in characterizing the general effectiveness of CBT in the treatment of anxiety.

Numerous meta-analyses on the effectiveness of various treatments for the anxiety disorders have been conducted, suggesting the need for succinct qualitative analysis of this large quantitative literature. In a previous review, Deacon and Abramowitz[11] examined the results of 10 years of meta-analyses on psychotherapies for the anxiety disorders with the primary goal of delineating the relative effectiveness of cognitive versus behavioral treatments (**Table 1**). These authors concluded that the relative efficacy of cognitive versus behavioral treatment for some anxiety disorders remains an open question. Addressing this question through meta-analysis is admittedly complicated by the observation that behavioral and cognitive treatments emphasize similar techniques (exposure vs behavioral experiments), with the only difference being the proposed mechanism for the observed benefits (eg, extinction in the case of exposure vs belief change). Another complication is that the therapeutic procedure (eg, exposure vs cognitive restructuring) should not be confused with the mediating mechanism of change (eg, fear extinction vs expectancy and appraisal modification). For example, one qualitative review suggests that minimal evidence exists that cognitive treatments enhance the efficacy of behavioral approaches for anxiety disorders.[12] However, even if this is true, changes in cognitive processes may still be the mechanism through which behavioral treatments work.[13] Accordingly, it is important to consider which therapeutic procedure leads to better outcomes, and the mechanisms through which the treatment actually works.

One popular view is that combined CBT approaches for some anxiety disorders are more effective than either cognitive or behavior therapy alone, and many clinicians likely use a combination of cognitive and behavioral therapeutic methods in the real world. Although the relative efficacy of cognitive versus behavioral treatments for anxiety disorders must be further addressed in future research, the incremental efficacy of their combination (CBT) over other bona fide treatments remains unclear and continues to be heavily debated.[14] Given these observations, this article synthesizes the results of meta-analytic studies published since the Deacon and Abramowitz[11] review examining the efficacy of CBT for various anxiety disorders. The article highlights the efficacy of CBT relative to other treatment approaches when data are available and concludes with a discussion of current and future directions in the enhancement and dissemination of CBT for the anxiety disorders.

PANIC DISORDER

CBT for panic disorder typically involves education about the nature and physiology of the panic response, cognitive therapy techniques designed to modify catastrophic

misinterpretations of panic symptoms and their consequences, and graduated exposure to panic-related body sensations (ie, interoceptive exposure) and avoided situations. Some CBT approaches[15] also include arousal-reduction techniques, such as diaphragmatic breathing or progressive muscle relaxation.

Several published meta-analyses have examined the relative efficacy of CBT for treating panic disorder. Siev and Chambless[16] contrasted the effects of CBT and relaxation training for patients with panic disorder without severe agoraphobia. Studies of CBT for panic disorder with severe agoraphobia were excluded, because treatment for these patients typically emphasizes in vivo exposure and differs from the standard application of CBT for less-agoraphobic patients. Five studies were located that directly compared the efficacy of CBT to relaxation training. None of the CBT interventions in these studies included a relaxation component. Taken together, results of these studies showed the superiority of CBT on a range of outcomes. The percentage of patients who no longer experienced panic attacks after treatment was significantly higher with CBT (77%) than with relaxation training (53%). Similar between-group differences in rates of clinically significant change (72% vs 50%) were observed. Drop-out rates (12% and 14% for CBT and relaxation treatments, respectively) were comparable between the treatments.

Notably, compared with patients undergoing relaxation training, those receiving CBT were less afraid of anxiety ($g = 0.64$) and endorsed significantly fewer catastrophic cognitions at posttreatment ($g = 0.48$). These findings indicate that CBT is superior to relaxation training in modifying catastrophic misinterpretations of anxiety and panic symptoms, a key cognitive process in cognitive behavioral models of panic disorder.[17] In contrast, CBT and relaxation training did not differ with respect to improvement in secondary measures such as general anxiety and depressive symptoms. Unfortunately, follow-up data on the maintenance of gains in these two treatments were not available. Overall, these findings highlight CBT as an efficacious treatment for panic disorder and suggest that relaxation training is less effective. Given that none of the CBT approaches analyzed by Siev and Chambless[16] incorporated a relaxation component, and component control dismantling studies also suggest the lack of additive value of relaxation training to standard CBT,[18] it seems that neither relaxation training nor breathing retraining produce incremental benefits beyond those achieved with traditional CBT techniques in panic disorder.

Mitte[19] conducted a comprehensive meta-analysis of CBT for panic disorder. Compared with no-treatment and placebo psychotherapy control groups, CBT was associated with significantly greater improvement on measures of anxiety, depression, and quality of life. Both CBT and behavior therapy without an explicit cognitive component were effective in reducing anxiety; however, CBT was superior to behavior therapy in reducing depressive symptoms and improving quality of life. Compared with behavior therapy, CBT was also associated with somewhat lower rates of attrition (12.7% vs 18.3%). Therapist-administered CBT was more effective than CBT administered in a self-help format. The investigator concluded that the combined CBT approach is the preferential psychological treatment for panic disorder.

SPECIFIC PHOBIA

CBTs for specific phobia[20] generally focus on exposure to the phobia-relevant stimuli. Exposure may be conducted either in vivo (ie, direct confrontation to actual phobic stimuli/situations) or imaginal (ie, imagery-based representations). Recent technologic advances have also allowed for the use of virtual reality exposures to phobic stimuli that may be otherwise difficult to create in the standard treatment setting (eg, flight

Table 1
Summary of review of meta-analyses on psychotherapies for anxiety disorders[11]

Anxiety Disorder	Meta-Analyses	Psychological Treatment Findings	Pharmacologic Findings
Panic disorder			
	Clum et al, 1993[88]	• ES ranking: psychological coping = exposure > flooding = combination treatments • However, NSD between in vivo exposure, flooding, or psychological coping	Antidepressants most effective
	van Balkom et al, 1997[89]	• In vivo exposure effective reducing panic/agoraphobia • Greater effects on avoidance in agoraphobia than on panic attacks	
	Bakker et al, 1998[90]	In vivo exposure ≈ psychological panic management with exposure	
	Gould et al, 1995[91]	• C-B treatments had largest ES • C-B had less drop-outs (vs pharmacologic or combination pharmapsychological) • Within C-B those combining cognitive restructuring with interoceptive exposure had strongest ES • C-B suggested to have best long term outcomes	NSD between antidepressants and benzodiazepines
	Oei et al, 1999[92]	C-B therapy is effective for panic with agoraphobia	
	Westen and Morrison, 2001[93]	Improvements were significant and maintained for cognitive behavioral treatments	
	Cox et al, 1992[94]	Exposure was significantly effective for phobia variables, further exposure had strong effect sizes consistently	Imipramine = ineffective for most variables; Alprazolam = improvements for panic and anxiety variables

Social phobia		
	Feske and Chambless, 1995[95]	Exposure = C-B interventions in potency
	Taylor, 1996[96]	• C-B therapies are effective • Effectiveness is improved by adding cognitive restructuring • Pre- to posttreatment: all psychological treatments were superior to placebo and follow-ups were maintained across treatments
	Gould et al, 1997[97]	Exposure alone and cognitive restructuring were more effective than restructuring alone
	Fedoroff and Taylor, 2001[98]	• Cognitive therapy alone or combined with exposure were both effective but NSD from each other • Exposure alone was no more effective than wait list Deacon and Abramowitz[11] suggest this is caused by reliance on confidence intervals
Posttraumatic stress disorder		
	van Etten and Taylor, 1998[99]	C-B treatments are effective for symptom reduction
	Sherman, 1998[100]	Psychological treatments have moderate effects on symptoms compared with wait list, supportive counseling, and dynamic therapy
Generalized anxiety disorder		
	Gould et al, 1997[101]	• ES rank: combined > anxiety management > relaxation > cognitive therapy > behavior therapy > relaxation with biofeedback • Only significant ES comparison was combined treatment > relaxation with biofeedback
	Westen and Morrison, 2001[93]	• C-B treatments were effective for GAD • Because of small number of studies, individual treatments not compared
	Borkovec and Whisman, 1996[102]	• All psychological treatments superior to wait-list • ES rank: behavioral > cognitive therapy • Highest ES incorporated combination of behavioral and cognitive

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Anxiety Disorder	Meta-Analyses	Psychological Treatment Findings	Pharmacologic Findings
Obsessive–compulsive disorder			
	van Balkom et al, 1994[103]	• No direct comparisons between treatments were conducted • However, ES for behavioral > cognitive therapy • Combination treatments were better than serotonergic antidepressants alone	All serotonergic antidepressants and combination with serotonergic antidepressant were more effective than placebo
	Abramowitz, 1997[104]	• Exposure more effective than cognitive approaches • Particularly ERP	Clomipramine = most effective serotonergic medications in reducing symptoms
	Abramowitz et al, 2002[105]	• ERP and cognitive therapies better than no treatment control • ES rank: ERP ≈ cognitive therapies	

Abbreviations: C-B, cognitive behavioral; ERP, exposure response prevention; ES, effect size; NSD, no significant difference; ≈, equal.

phobia[21]). In addition to exposure-based protocols, some treatments also incorporate cognitive restructuring to address beliefs and expectancies that may contribute to the phobic anxiety.

Only one meta-analysis of specific phobia treatment outcome exists, synthesizing findings from 33 outcome studies.[22] Treatments were classified as either exposure-based (ie, included at least some procedure that involved confronting the feared stimuli), non–exposure-based (ie, treatments theorized to be active, but not involving exposure, such as relaxation and cognitive restructuring), placebo treatments (ie, procedures in which patients were given a credible rationale but not provided an intervention known to remediate specific phobia, such as education), or wait-list controls. The effect sizes for posttreatment comparisons against wait-list-control groups were 1.05, 0.98, and 0.57 for exposure-based, non–exposure-based, and placebo treatments, respectively. The effect size for comparisons between exposure-based treatments and placebo treatments was 0.48 at posttreatment and 0.8 at follow-up. The effect size for comparisons between exposure-based protocols and non–exposure based protocols was 0.44 at posttreatment, and 0.35 at follow-up. In vivo exposure protocols also outperformed non–in vivo based protocols at posttreatment (Cohen's $d = 0.38$) but not at follow-up. No significant differences were seen between exposure-based protocols that last 1 session versus 5. However, length of treatment was found to moderate the effect sizes of exposure-based interventions versus wait-list controls, with longer treatments tending to produce larger effect sizes. No significant differences were seen between exposure-only approaches and those that also included cognitive therapy elements. Differences in the type of phobia also did not moderate treatment outcome.

This meta-analysis concludes that in vivo exposure is the preferred treatment for specific phobia. Although non–exposure-based approaches provide large effect sizes, the effect sizes for exposure-based interventions were significantly larger when directly compared. In vivo exposure produced larger effect sizes than non–in vivo exposure at posttreatment, but not at follow-up. Some evidence showed that longer-lasting treatments tended to produce larger effects, although single-session exposure treatments also produced comparably large effect sizes to five-session exposure treatments. Finally, exposure-based protocols outperformed placebo treatments, showing that exposure principles add incremental efficacy above those achieved through nonspecific treatment factors.

SOCIAL PHOBIA

CBT for social phobia typically emphasizes cognitive restructuring and in vivo exposure to feared social situations. Patients are instructed in identifying and challenging their beliefs about their social competence and the probability of experiencing negative social evaluation and consequences. In vivo exposures provide opportunities to confront feared and avoided social encounters and to practice social skills. CBT for social phobia is often delivered and studied in group format.[23] Compared with individual therapy, group CBT conveniently allows in vivo exposures to be conducted in the therapy setting using group members as confederates or audience members, and provides opportunities for patients to receive immediate support, feedback, and reinforcement from other group members.

A recent meta-analysis examined the effectiveness of psychotherapy for social phobia and social anxiety under various conditions.[24] Twenty-nine studies were located that involved comparisons between a bona fide psychotherapy and a wait-list or psychological placebo control group. Most studies used CBT techniques such as exposure,

cognitive restructuring, social skills training, relaxation, or a combination of these elements. Overall, CBT interventions produced controlled effect sizes in the 0.70 to 0.80 range on measures of social anxiety, general anxiety, and depression. Effect sizes were higher in studies that were compared with wait-list control groups and when analog socially anxious participants were treated. Specific therapy techniques, such as exposure and cognitive restructuring, were not associated with higher effect sizes. However, given the substantial heterogeneity in the samples and treatment approaches used in the studies, it is difficult to make firm conclusions about the relative efficacy of different CBT techniques. Furthermore, studies comparing the effects of different CBT approaches with more clinically representative populations seem warranted.[25]

Segool and Carlson[26] conducted a meta-analysis of CBT studies in socially phobic children and adolescents. The authors identified seven group studies of CBT, defined as exposure plus cognitive restructuring, in youths aged 5 to 18 years (mean age, 10.5), with the average number of therapy sessions equaling 11.9. Within-group effect size estimates were calculated to quantify the degree of improvement from pretreatment to posttreatment. CBT produced large and statistically significant improvement in social anxiety symptoms (d = 0.86), general anxiety symptoms (d = 0.75), and impairment (d = 1.56). Seven studies of selective serotonin reuptake inhibitor (SSRI) medications were also located, with SSRIs producing significantly greater improvement than CBT on each outcome variable. Unfortunately, the authors did not examine the possible influence of publication bias on the apparent efficacy of SSRI medications. The authors concluded that both CBT and SSRI medications are effective in the treatment of children with social phobia.

OBSESSIVE–COMPULSIVE DISORDER

The development of exposure and response prevention (ERP)[27] challenged previously held notions that obsessive–compulsive disorder (OCD) is unresponsive to psychotherapy. It is now widely accepted that ERP is an efficacious treatment of OCD,[28] and regarded as a first-line treatment for this condition.[29] Cognitive interventions that derive from Beck's[30] cognitive model of depression have also been applied to the treatment of OCD. The addition of cognitive elements to the treatment of OCD has raised important questions regarding the incremental efficacy of cognitive and ERP approaches.[11] The effect sizes for ERP, CBT, and CT interventions for OCD were similar across these modalities, although slightly stronger for ERP and CBT conditions.[31] Across all treatments, approximately two thirds of the patients who completed treatment improved (range, 33%–78%), whereas only one third met recovery criteria (range, 27%–47%). Among the intent-to-treat sample (including patients who chose not to complete), about one half of patients improved (range, 25%–74%), compared with only one fourth who recovered (range, 22%–33%). Findings were again stronger for ERP relative to the other conditions. ERP posttreatment OCD symptom levels were also generally lower than the poststreatment outcomes for CBT and CT.

The efficacy of CBT in pediatric OCD samples has also been investigated.[32,33] A recent meta-analysis included only investigations using randomized, controlled methodology for OCD participants aged 19 years and younger.[34] A comprehensive literature review yielded 13 randomized controlled trials containing 10 pharmacotherapy to control comparisons and 5 CBT to control comparisons. A statistically significant pooled effect size that was robust against publication bias was found for only pharmacotherapy and CBT, with CBT yielding a stronger effect size (1.45) over pharmacotherapy (0.48).

However, the durability of the effects of CBT for pediatric OCD remains largely unknown. In a recent review of the long-term outcome of OCD among youth in general,

Stewart and colleagues[35] found 22 studies with follow-up periods ranging between 1 and 15.6 years. At follow-up, rates of persistent full OCD (range, 13%–87%; pooled mean, 41%) and subclinical OCD (range, 17%–46%; pooled mean, 19%) were reported to be lower than expected.

Cost-effectiveness considerations have motivated the application of CBT interventions for OCD in a group format. In a meta-analysis of 13 trials examining the efficacy of group CBT for OCD, Jonsson and Hougaard[36] reported overall a pre- to posteffect size of 1.18 and between-group effect size of 1.12 when compared with wait-list control conditions.[36] Furthermore, group CBT achieved better results than pharmacological treatment in two studies included in the meta-analysis. Although one study in this meta-analysis found no significant differences between individual and group CBT, Eddy and colleagues[31] found that pre- versus posttreatment effect sizes were slightly higher for individual therapy (1.48) than for group therapy (1.17). Furthermore, patients who completed individual therapy had a greater percentage of those meeting recovery criteria (mean, 44%) relative to those participating in the group format (mean, 28%). Among the intent-to-treat sample, 37% of patients in individual therapy recovered, compared with only 22% of those in group-based approaches.

Contemporary meta-analyses continue to support the efficacy of interventions for OCD that are based on empirically supported behavioral and cognitive principles. Specifically, these findings clearly indicate that ERP, CBT, and cognitive therapy have strong effects in the treatment of OCD. In fact, a recent meta-analysis suggests that the strongest effect sizes for CBT across the anxiety disorders are generally observed for OCD.[37] Furthermore, ERP seems to be more efficacious than cognitive approaches. Although cost-effectiveness concerns may warrant the implementation of group CBT approaches, empirical findings support the superiority of individual over group interventions for OCD.

An important issue that must be further addressed in these randomized controlled trials is that of sustained efficacy.[31] Although some evidence shows that the long-term persistence of OCD after treatment may be lower than previously thought,[35] additional research is needed to adequately determine the extent to which CBT produces lasting symptom changes for patients with OCD. This assessment will require future studies to include substantially longer follow-up intervals (ie, $\geq$1 year posttreatment) so more definite inferences can be made regarding the durability of CBT for OCD.

POSTTRAUMATIC STRESS DISORDER

CBTs for posttraumatic stress disorder (PTSD) typically include three components: (1) psychoeducation about the nature of fear, anxiety, and PTSD; (2) controlled, prolonged exposure to stimuli related to the traumatic event; and, (3) cognitive restructuring, processing, or challenging of maladaptive beliefs/appraisals. Relaxation training or breathing retraining components are periodically included in some treatment packages. The most-studied CBT approaches are prolonged exposure[38] and cognitive processing therapy.[39]

A meta-analysis of PTSD is particularly notable because it coded for many relevant variables pertaining to clinical utility and external validity beyond just reporting treatment outcome effect sizes.[40] The authors noted, however, that approximately 40% of studies failed to report inclusion/exclusion rates. Most studies excluded participants because of psychosis (85%), organic disorders (77%), suicide risk (46%), alcohol or drug abuse or dependence (62%), and unspecified concerns of serious comorbidity (62%). Comorbidity data were also sparsely reported for both axis I (42%) and II (12%) disorders. Nonetheless, these data allow for some important

inferences regarding to whom the treatment outcome effect size results can be generalized.

Bradley and colleagues[40] report treatment outcome effect size estimates for exposure therapy, eye movement desensitization and reprocessing (EMDR) therapy, exposure therapy plus cognitive restructuring, and CBT. In this meta-analysis, CBT referred to all forms of CBT that did not include exposure or EMDR (eg, cognitive restructuring–only was considered CBT); 79% of participants who entered a treatment study completed it. The pre- versus posttreatment effect sizes were as follows: exposure (1.57); CBT (1.65); exposure plus cognitive restructuring (1.66); EMDR (1.43); wait-list control (0.35); and, supportive control (0.59). The effect sizes for the active treatments compared with wait-list controls were 1.26, 1.26, 1.53, and 1.25 for exposure, CBT, exposure plus cognitive restructuring, and EMDR, respectively. The effect sizes for the active treatments compared with supportive control conditions were 0.84, 1.01, 0.99, and 0.75 for exposure, CBT, exposure plus cognitive restructuring, and EMDR, respectively. The rates of change in diagnostic status (ie, no longer meeting criteria for PTSD) across the treatment conditions among the intent-to-treat samples were best for EMDR (60%), followed by exposure plus cognitive restructuring (54%), exposure (53%), CBT (46%), supportive control (36%), and wait-list control (14%). The rates of change in diagnostic status across the treatment conditions among the treatment-completer samples were most favorable for exposure plus cognitive restructuring (70%), followed by exposure (68%), EMDR (65%), CBT (56%), supportive control (39%), and wait-list control (16%). Because few studies reported follow-up data of at least 6 months, the authors were only able to provide effect sizes confidence intervals (CIs) for pretreatment versus follow-up comparisons for exposure (95% CI = 0.92–2.57), CBT (95% CI = –0.11–3.01), and exposure plus cognitive restructuring (95% CI = 1.58–2.55).

Finally, Bradley and colleagues[40] also reported on variables that moderate treatment outcome. Year of publication was positively associated with pre- versus posttreatment effect sizes and treatment versus wait-list control effect sizes. Number of exclusion criteria was positively associated with pre- versus posttreatment effect sizes, such that studies with more exclusion criteria tended to have greater effect sizes. Completion rate was negatively associated with pre- versus posttreatment effect sizes, such that greater dropout rate was associated with greater effect sizes. Type of trauma also moderated treatment outcome, with combat-related trauma groups yielding smaller effect sizes than those for mixed trauma or sexual assault.

Other meta-analyses of PTSD treatment outcome have similarly found evidence for the efficacy of CBT. Bisson and colleagues[41,42] compared CBT treatments (which they called *trauma-focused treatments*, indicating any treatment that focused directly on trauma-related memories, such as exposure or cognitive restructuring), EMDR, and non–trauma focused treatments (eg, stress management). The authors found that the treatment versus wait-list effect sizes were 1.4, 1.5, and 1.1 for CBT, EMDR, and stress management, respectively. The relative risk for retaining the diagnosis of PTSD in the treatment conditions relative to the control groups was lowest (ie, implying that participants no longer met PTSD diagnostic criteria) in CBT (0.44), followed by EMDR (0.49), and stress management (0.64). This meta-analysis also examined the effects of treatment on general anxiety and depression. For depression, effect sizes for the treatment versus control group were 1.26, 1.48, and 0.73 for CBT, EMDR, and stress management, respectively. For anxiety, effect sizes for the treatment versus control group were 0.99, 1.20, and 0.73 for CBT, EMDR, and stress management, respectively.

In another meta-analysis, Seidler and Wagner[43] compared the efficacies of CBT (which they referred to as *trauma-focused CBT*) and EMDR. Seven studies that directly compared CBT with EMDR were included. The effect size for the CBT versus EMDR post-treatment comparison was 0.28, favoring CBT, although the CI overlapped with zero and thus was not considered to be significant. The effect size for the CBT versus EMDR follow-up comparison was 0.13, again favoring CBT, but the CI again overlapped with zero and was considered nonsignificant. True comparisons between the efficacies of CBT (and its components) and EMDR have not been without controversy. Several authors[44,45] and dismantling studies[46] suggest that the active element of EMDR is imaginal exposure, a known active factor in exposure-based treatments, and eye movements are an additive, yet nonactive component in therapy. Based on these findings, caution is warranted in comparing CBT and EMDR in PTSD treatment outcome studies.

Meta-analyses have also been conducted on randomized controlled trials of treatments aimed at preventing the onset of PTSD after initial traumatic event exposure.[47,48] Roberts and colleagues[48] conducted a meta-analysis of 25 studies investigating the prevention of PTSD for individuals exposed to a traumatic event within the past 3 months. Effect sizes suggested that posttreatment symptoms of PTSD were not lower for psychoeducation or structured writing treatments relative to control groups. By contrast, trauma-focused CBT (ie, interventions that focused on the traumatic memories, including exposure and cognitive therapy elements) resulted in lower risk for PTSD diagnoses compared with wait-list control at 3 months follow-up (relative risk, 0.64), and lower risk for PTSD diagnoses compared with supportive counseling at 3 to 6 months (relative risk, 0.37) and 3 to 4 years (relative risk, 0.28) posttreatment. Trauma-focused CBT also resulted in fewer PTSD symptoms relative to supportive counseling at posttreatment ($d = 0.95$), 3 to 6 months follow-up, ($d = 0.62$), and 2 to 4 years follow-up ($d = 0.85$).

The meta-analysis conducted by Kornor and colleagues[47] included studies of individuals with acute stress disorder or initial symptoms of PTSD. The seven comparative studies included supportive counseling for trauma-focused CBT, defined as an intervention that consisted of any of the following components: exposure, stress inoculation, cognitive processing, assertiveness, biofeedback, or relaxation training. The relative risks for being diagnosed with PTSD at 3 to 6 months, 9 months, and 36 to 48 months posttreatment were 0.49, 1.09, and 0.73, respectively, with all effect sizes favoring trauma-focused CBT. The only statistically significant effect was at 3 to 6 months posttreatment.

These meta-analyses show that CBT procedures are efficacious in the treatment and prevention of PTSD. The qualitative review of these studies highlights the significant heterogeneity with the combination of treatment elements that fall under the umbrella term *CBT*. Furthermore, CBT outperforms both wait-list controls and supportive counseling controls, showin that CBT procedures provide incremental efficacy above and beyond the efficacy provided by nonspecific factors. The effect sizes for primarily exposure-based protocols were not substantially different from those of primarily cognitively based protocols or the combination of exposure and cognitive therapy. Accordingly, clinicians can confidently use any of one these CBT procedures.

GENERALIZED ANXIETY DISORDER

Generalized anxiety disorder (GAD) is marked by excessive and uncontrollable worry. However, the unspecified nature of worry cues and the often diverse and fluctuating nature of the worry content complicates the application of specific treatments. GAD has been well documented as one of the most difficult anxiety disorders to treat,[49]

yielding lower treatment response relative to other anxiety disorders. However, the combination of various CBT-based approaches for treating GAD has produced promising results. These CBT interventions vary considerably in the relative combination of specific techniques used, such as self-monitoring, relaxation training, cognitive therapy, worry exposure, and the rehearsal of new learned relaxation and cognitive coping responses.

In a meta-analysis examining a total of 65 CBT and pharmacological studies for GAD, Mittes[50] found a significant medium-to-large effect size for CBT compared with wait-list and psychological/pill placebo. Significant symptom improvement as a function of CBT compared with wait-list was observed for anxiety and depression (effect sizes, 0.82 and 0.76, respectively) and psychological/pill placebo (effect sizes, 0.57 and 0.52, respectively). Direct comparison of CBT and pharmacotherapy showed a significantly greater effect for CBT among studies that examined the efficacy of both treatment approaches. Although the incremental efficacy of CBT compared with pharmacotherapy was no longer observed after controlling for study-specific parameters, attrition rates were lower for CBT. These finding are similar to those of Haby and colleagues,[51] who report an effect size of 0.64 for the efficacy of CBT relative to controls. However, an important conclusion from this study is that these effect size estimates seem to be contingent on the type of control group used and the baseline severity of patients included in the randomized controlled trials.

A comprehensive examination of the GAD treatment outcome literature by Hunot and colleagues[52] found that 46% of patients assigned to CBT showed clinical response at posttreatment, in contrast with 14% in wait-list/treatment-as-usual groups. Furthermore, those undergoing CBT were more likely to show reduction in anxiety and depression symptoms than those undergoing analytic therapy at posttreatment and at 6-month follow-up. CBT treatment completers also showed a greater reduction in depression symptoms at posttreatment relative to patients who completed supportive therapy. Although evidence for the incremental efficacy of some treatments for GAD versus others is limited to a small number of studies, the general consensus of the available literature is that a cognitive behavioral approach seems to be more effective than non-CBT modalities in maximizing treatment gains. However, the question remains as to which CBT interventions are most effective for treating GAD.

Siev and Chambless[16] recently examined the question of the specificity of treatment effects of cognitive therapy and relaxation training for GAD. The findings showed that the weighted average percentage of patients meeting criteria for clinically significant change at posttreatment was 44% for cognitive therapy and 45% for relaxation training, suggesting that the treatment groups did not differ in the relative odds of achieving clinically significant change at posttreatment. Furthermore, no difference was seen between the treatment groups in anxiety, anxiety-related cognitions, and depression.

Meta-analytic investigations have also examined the efficacy of CBT for chronic worry among patients with GAD. For example, Covin and colleagues[53] found a large effect size when comparing CBT with a control group (–1.15). Subsequent analysis showed that the average weighted effect size was larger (–1.69) for young adults than for older adults (–0.82), suggesting that CBT for GAD may not be as effective in older adults. However, treatment gains made by patients of all ages after CBT were largely maintained for up to 1-year follow-up. This finding suggests that CBT may yield longer-term benefits toward preventing symptom relapse in GAD. Meta-analytic findings also suggest superiority of individual CBT (effect size, –1.72) over group CBT (effect size, –0.91) in reducing chronic and uncontrollable worry symptoms in GAD.

Although more recent meta-analyses continue to support the efficacy of CBT for GAD, effect sizes for GAD are lower than those observed in other anxiety disorders.[54] This observation has reinforced the need for additional techniques that can be incorporated into standard CBT for GAD to maximize efficacy. Emotion regulation models of GAD posit that cognitive avoidance strategies in GAD, such as worry, are largely used to avoid the experience of negative emotions. Accordingly, effective treatment of GAD should provide patients with the tools to (1) identify, differentiate, and describe emotions, even in their most intense form; (2) increase acceptance of affective experience and ability to adaptively manage emotions when necessary; (3) decrease use of worry and other emotional avoidance strategies; and, (4) increase ability to use emotional information in identifying needs, making decisions, guiding thinking, motivating behavior, and managing interpersonal relationships and other contextual demands.[55] Researchers have begun to consider incorporating specific techniques in the management of GAD and worry, such as learning to identify emotions and their possible evolutionary functions, creating an emotion hierarchy to systematically address different emotions, using imaginal exposure to increase tolerance to different emotions, and eliminating behavioral avoidance of emotional experiences.[56]

FUTURE DIRECTIONS IN COGNITIVE BEHAVIORAL THERAPY FOR ANXIETY DISORDERS

Enhancing Efficacy

Contemporary meta-analytic findings support the efficacy of CBT for treating anxiety disorders, with CBT being more efficacious than other bona fide treatments for specific anxiety disorders. Although these data are consistent with the view held by many that CBT is the gold standard psychosocial treatment for anxiety, CBT interventions are by no means 100% effective. For example, one study found that 27% of patients that were panic-free after a trial of CBT underwent additional panic treatment over a 2-year follow-up period.[57] The questionable durability of CBT for treating anxiety disorders has encouraged researchers to examine augmenting approaches, such as pharmacotherapy, to enhance its effectiveness. Unfortunately, clinical trials have generally failed to show a consistent benefit of augmenting CBT with either anti-anxiety or antidepressant medications.[29,58,59]

Other lines of research have focused on supplementing exposure-based interventions with biological agents that enhance learning and facilitate fear extinction. D-cycloserine (DCS), a drug approved by the U.S. Food and Drug Association for treating tuberculosis, has been shown in animal studies to enhance the consolidation of learning processes that underlie fear extinction.[60] The use of DCS to augment exposure therapy is fundamentally different from combination treatment with traditional pharmacological agents because the sole purpose of DCS is to enhance the effects of exposure, rather than produce a general state of sedation or correct a presumed biological dysfunction.

In the first anxiety study of DCS, Ressler and colleagues[61] randomly assigned 27 adults with acrophobia to undergo two sessions of virtual reality exposure combined with either pill placebo, 50 mg of DCS, or 500 mg of DCS. The DCS or placebo was ingested 2 to 4 hours before each exposure session. Patients in each group had equivalent levels of fear during the first exposure session. However, during the second exposure session, 1 week later, and at 3-month follow-up, patients who had received either dose of DCS were less afraid during the exposures than patients who received placebo. The beneficial effects of DCS extended beyond the virtual world, with

patients receiving DCS reporting fewer real-world acrophobic symptoms than those receiving placebo at each assessment.

Clinical trials have examined the effects of combining DCS with exposure in the treatment of social phobia, panic disorder, OCD, and specific phobias.[62] In nearly all studies, augmenting exposure therapy with DCS produced substantial benefits at both posttreatment and follow-up compared with placebo augmentation. In addition to DCS, other potential cognitive-enhancer agents also seem to facilitate fear extinction in exposure therapy. Augmenting exposure for claustrophobia with yohimbine, a selective competitive α_2-adrenergic receptor antagonist, has been shown to substantially improve outcomes in comparison with placebo augmentation.[63] Similarly, administration of the glucocorticoid cortisone before exposure tasks produced significantly improved outcomes for patients with social phobia and spider phobia.[64] Future cutting-edge research on combining exposure therapy with these nontraditional pharmacological agents holds significant promise for improving the efficacy of CBT and may help reduce the total number of sessions to achieve desirable treatment outcomes.

Enhancing Dissemination

Despite the efficacy of CBT, considerable evidence shows that most individuals with anxiety disorders do not receive this empirically supported intervention. In 1996, psychodynamic therapy was the most common psychosocial treatment for patients with GAD, panic disorder, and social phobia.[65] More recent work has shown that half or more of doctoral-level licensed therapists who treat OCD do not use ERP, the empirically supported preferred treatment.[66] Furthermore, only half of the licensed psychotherapists who treat patients with PTSD use imaginal exposure.[67] Evidence also shows that when CBT approaches are used to treat anxiety disorders, they are often being delivered suboptimally. For example, 60% of a small sample of patients with OCD who reported undergoing CBT did not meet defined minimal criteria for adequacy.[68] The limited availability and poor delivery of CBT for anxiety are strong indicators of inadequate dissemination.

Fortunately, the dissemination (targeted distribution of information on evidence-based health interventions) and implementation (adaptation and application of these interventions over time) of CBT interventions for anxiety have become a focus of recent research.

Population-based dissemination efforts, such as computerized CBT delivery for primary care patients with anxiety disorders, have yielded promising findings.[69] For example, Craske and colleagues[70] examined the acceptance and effectiveness of a computer-assisted CBT program designed to support the delivery of CBT for panic disorder, PTSD, GAD, and social anxiety disorder in primary care. The program was rated as very helpful by clinicians. Results indicate that the patients fully participated (ie, attendance and homework compliance), understood the program material, and acquired CBT skills. Furthermore, patients with anxiety disorder reported significant improvements in self-rated anxiety and depression. The effectiveness of this computerized approach highlights a potential role of Web-based technologies in increasing the efficiency of CBT dissemination for anxiety disorders. Internet delivery of CBT components for anxiety disorders has increased rapidly over recent years, and treatment outcome research examining the efficacy of this approach has found large effect sizes for some anxiety disorders.[71]

ATTENTION RETRAINING TREATMENT FOR ANXIETY DISORDERS

A large body of research suggests that attention is biased toward threat-relevant stimuli in anxiety.[72] More recently, research has shown that this bias may actually

causally influence anxiety vulnerability. Macleod and colleagues[73] found that nonanxious individuals who were trained to attend toward threatening stimuli in a computerized attentional bias task showed greater emotional reactivity during a subsequent frustrating anagram task compared with individuals in a control condition. Subsequent studies then examined whether training attention away from threat would lead to decreases in symptoms of anxiety disorders.

Attention retraining treatment procedures are computerized tasks that typically modify the ''dot probe'' attentional bias task.[74] Participants see two stimuli displayed above and below a fixation cross on a computer screen. One stimulus is threatening, the other stimulus is neutral. The stimuli disappear after 500 ms and a probe appears in either the top or bottom of the screen. The participants' task is to determine the location (top or bottom) of the probe stimulus as quickly as possible. In the attention retraining protocol, the probe always occurs in the location previously occupied by the neutral stimulus. Thus, over time, the participant learns to attend to the neutral stimulus, as the neutral stimulus signals the impending location of the probe. This training counters the anxious individual's tendency to attend to the threatening stimulus; therefore, the attention retraining protocols are theorized to correct attentional biases toward threat. In control procedures, the location of the probe is randomized and occurs equally in locations previously occupied by the threat and neutral stimuli. Randomized controlled trials have found that the attention retraining protocols reduce symptoms of social phobia[75–77] and GAD[78,79] compared with the control conditions. These data show that attention retraining procedures may be effective stand-alone treatments for anxiety disorders. Furthermore, attention retraining procedures seem to be well-suited for Internet delivery, which could help disseminate effective treatments to many individuals experiencing anxiety.

Although preliminary data examining the efficacy of attention retraining as an intervention component for anxiety disorders are promising, research along these lines have not been entirely consistent. For example, one study found that attention retraining only led to reductions in symptoms on one of three measures of social phobia.[80] Additionally, Klumpp and Amir[81] found that two groups of socially anxious individuals who underwent either one session of attention training toward threat or attention training away from threat both displayed reduced anxiety during a subsequent social stressor relative to a control group. Although the authors argued that these data are consistent with the notion that attention training improves attentional control, which subsequently reduces social anxiety, the fact that training attention toward threat reduces symptoms of anxiety disorders calls into question the notion that attentional biases causally increase or maintain anxiety,[73] which was the foundation for this line of research. The mechanisms producing attentional biases are only beginning to be elucidated,[82–84] and the mechanisms through which reduction of these biases leads to improvements in anxiety are even less clear. However, future research delineating the mechanisms of action of attention retraining and their incremental efficacy to existing CBT treatments may offer more definitive data regarding this computerized treatment approach.

SUMMARY

This article summarizes recent meta-analytic findings supporting the efficacy of CBT for anxiety disorders. However, the exact mechanisms of change in these treatments remain unclear. Prior work suggests that behavioral interventions in the form of exposure during CBT may constitute the dominant, active ingredient in the treatment of some anxiety disorders, particularly OCD and social phobia.[11] Although some form

of exposure may be necessary and sufficient for the treatment of OCD and social phobia, the extent to which this is true for other anxiety disorders remains unclear. More randomized controlled trials using dismantling designs (ie, studies that take apart the multiple components of a given treatment) will be necessary to better determine the specific active features of CBT. Constructing the appropriate combination of components relative to nonspecific control conditions will facilitate multiple component comparisons. These comparisons allow for strong experimental tests of the effects of alternative treatment components, key components, and the combined treatment components of CBT.[85]

Dismantling randomized controlled trials of CBT will also help identify the necessary (and perhaps sufficient) components of CBT that should be the focus of further enhancement and dissemination. A general consensus exists that exposure is a central feature of CBT for all anxiety disorders,[86] and the form of exposure varies depending on the core feature of the anxiety disorder. Exposure therapy may consist of systematic and repeated approach to feared external (agoraphobic situations) and internal (bodily sensations) stimuli. Imaginal exposure is also an empirically supported treatment of trauma memories in PTSD. Virtual reality exposure is also being increasingly used to treat phobias, social anxiety disorder, and PTSD. Augmenting exposure delivery with cognitive enhancer agents also holds promise in improving the efficiency of treatment delivery. Advancing the efficacy and dissemination of CBT for anxiety disorders will continue to require systematic investigation with basic research models in fear learning and extinction.[87]

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