

# Cognitive behavioral therapy for the treatment of post-traumatic stress disorder: a review

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**Background:** Post-traumatic stress disorder (PTSD) is a psychiatric sequel to a stressful event or situation of an exceptionally threatening or catastrophic nature. Cognitive behavioral therapy (CBT) has been used in the management of PTSD for many years. This paper reviews the effectiveness of CBT for the treatment of PTSD following various types of trauma, its potential to prevent PTSD, methods used in CBT, and reflects on the mechanisms of action of CBT in PTSD.

**Methods:** Electronic databases, including PubMed, were searched for articles on CBT and PTSD. Manual searches were conducted for cross-references in the relevant journal sites.

**Results:** The current literature reveals robust evidence that CBT is a safe and effective intervention for both acute and chronic PTSD following a range of traumatic experiences in adults, children, and adolescents. However, nonresponse to CBT by PTSD can be as high as 50%, contributed to by various factors, including comorbidity and the nature of the study population. CBT has been validated and used across many cultures, and has been used successfully by community therapists following brief training in individual and group settings. There has been effective use of Internet-based CBT in PTSD. CBT has been found to have a preventive role in some studies, but evidence for definitive recommendations is inadequate. The effect of CBT has been mediated mostly by the change in maladaptive cognitive distortions associated with PTSD. Many studies also report physiological, functional neuroimaging, and electroencephalographic changes correlating with response to CBT.

**Conclusion:** There is scope for further research on implementation of CBT following major disasters, its preventive potential following various traumas, and the neuropsychological mechanisms of action.

**Keywords:** post-traumatic stress disorder, cognitive behavioral therapy, prevention, treatment, mechanisms of action, trauma

## Introduction

Post-traumatic stress disorder (PTSD) is a debilitating mental health condition frequently associated with psychiatric comorbidity and diminished quality of life, and typically follows a chronic, often lifelong, course.<sup>1</sup> Given the ubiquitous nature of threatening or catastrophic trauma, PTSD is becoming more and more common. It may affect 10% of women and 5% of men at some stage.<sup>2</sup> Depending upon the nature and degree of the traumatic event, the prevalence rates of PTSD in victims have been reported to approach 100%.<sup>3</sup> The PTSD syndrome is a conglomeration of various cognitive, behavioral, and physiological disturbances characterized by three symptom clusters, ie, intrusion, avoidance, and arousal.

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Since the introduction of PTSD into the diagnostic classificatory systems in 1980,<sup>4</sup> considerable research has been done on the efficacy of cognitive behavioral therapy (CBT) in its treatment.<sup>5</sup> Currently, trauma-focused CBT is recommended for PTSD by various treatment guidelines and expert consensus panels.<sup>6–10</sup> The purpose of this review is to evaluate the studies of CBT for PTSD following various types of trauma, and those related to physical disorders in adults, children, and adolescents. It is also intended to review the long-term outcome and preventive role of CBT in PTSD and various modes of delivery of CBT in practice, and the current understanding of its mechanism of action is also discussed.

## Methods

A literature search was conducted in electronic databases, including PubMed, for articles on CBT and PTSD. Search with key terms of (“cognitive behavior therapy” OR CBT[All Fields]) AND (“stress disorders, post-traumatic” [MeSH Terms] OR (“stress” [All Fields] AND “disorders” [All Fields] AND “post-traumatic” [All Fields]) OR “post-traumatic stress disorders” [All Fields] OR “PTSD” [All Fields]) resulted in 192 articles representing 58 randomized controlled trials. A further manual search found seven further randomized controlled trials in the relevant area. Studies that did not include patients with PTSD or CBT, or were not relevant to the topic, were excluded. This left 31 randomized controlled trials involving CBT in PTSD patients (see Table 1).<sup>11–41</sup> In addition, manual searches were conducted for relevant articles in specific areas for a comprehensive review. While the randomized controlled trials have established the efficacy of CBT in PTSD secondary to various types of trauma in different situations and age groups, various other studies have widened the applicability and usability of CBT in PTSD. There is extensive literature in this area which needs comprehensive review.

## CBT for PTSD in adults Terrorism

CBT has been found to be effective for PTSD following terrorist attacks, eg, in the survivors of the 9/11 terrorist attack on the World Trade Center,<sup>42</sup> the 2005 London bombings,<sup>43</sup> and the 1998 bomb explosion in Omagh, Northern Ireland.<sup>44</sup> CBT for the victims of the World Trade Center attack was manualized, applied flexibly, in 12–25 sessions, by therapists with no prior training through to extensive training in CBT. There were significant pre-post reductions in symptoms of PTSD and depression.<sup>42</sup> The improvement in PTSD in

victims of the 2005 London bombings was well maintained at an average of one year later.<sup>43</sup> Patients with PTSD secondary to the bomb explosion in Omagh received an average of eight treatment sessions by staff with modest prior training in CBT for PTSD. However, the degree of improvement was comparable with that in reported research trials, in spite of the fact that almost half of the patients (53%) had psychiatric comorbidity.<sup>44</sup>

## War trauma

The traumas of war have long been associated with PTSD. In addition, soldiers exposed to combat remain at high risk for developing the disorder.<sup>45</sup> Multicomponent CBT showed promise in a group of male combat veterans with severe and chronic PTSD for improving social functioning beyond that provided by exposure therapy alone, particularly by increasing social engagement and interpersonal functioning.<sup>46</sup> CBT with brief virtual reality exposure has been found to be beneficial in treating PTSD in war veterans.<sup>45</sup> A 12-session integrated treatment using components of cognitive processing therapy for PTSD, and CBT for chronic pain management in veterans with comorbid chronic pain and PTSD, suggested not only the feasibility of this treatment approach but also clinical benefit.<sup>47</sup>

## Sexual assault

There is evidence that CBT is successful in reducing the symptoms of PTSD following assault on females, rape,<sup>32,48,49</sup> and childhood sexual abuse.<sup>33</sup> It has been observed that these gains could be maintained in the long term at follow-up assessments.<sup>32,48</sup> A study comparing prolonged exposure alone, prolonged exposure plus cognitive restructuring, or wait-list in female patients with chronic PTSD following sexual assault, found that both treatments reduced PTSD and depression in intent-to-treat (ITT) and completer samples compared with wait-list. However, the addition of cognitive restructuring did not enhance the treatment outcome. This study showed that treatment by counselors with minimal CBT experience was as efficacious as that of CBT experts.<sup>50</sup> Studies have found that CBT helps to decrease self-reported PTSD severity and associated anxiety, and that participants do not meet criteria for a PTSD diagnosis at follow-up assessments, showing sustained improvement.<sup>32,33</sup>

## Road traffic accidents

Motor vehicle accidents are common precipitants of PTSD. There is evidence for efficacy of trauma-focused CBT for motor vehicle accident-related PTSD.<sup>18,51</sup> CBT elements, like

**Table 1** Randomized controlled trials involving cognitive-behavioral therapy in patients with post-traumatic stress disorder

Reference	Trauma/context	Therapy	Comparator	Findings/outcome
11	Acute PTSD from various trauma	Brief CBT	WL	Brief early CBT group had significantly fewer symptoms at one week post intervention, but the difference was smaller and not significant at 4 months. However, patients with baseline comorbid major depression and who were included within the first month of incident had significantly lower PTSD scores at 4 months.
12	Chronic PTSD	CBT	Rogerian ST	A 2-year follow-up study where CBT retained significantly more patients in treatment than ST, but its effects were equivalent to those of ST in the completers. CBT was better in the dimensional IIT analysis at post test.
13	PTSD patients in outpatient clinic	CBT	Structured writing therapy	No differences in efficacy were detected between CBT and structured writing therapy.
14	Comorbid PTSD and substance use disorders in women	Manualized CBT addressing both PTSD and substance abuse	Manualized CBT addressing only substance abuse, standard community care	Participants in both CBT conditions had significant reductions in substance use, PTSD, and psychiatric symptoms, but community care participants worsened over time. Improvement was maintained at 6- and 9-month follow-ups.
15	Comorbid PTSD in severe mental illness	CBT	TAU	CBT clients improved significantly more than did clients in TAU at blinded posttreatment and 3- and 6-month follow-up assessments in PTSD symptoms, other symptoms, perceived health, negative trauma-related beliefs, knowledge about PTSD, and case manager working alliance.
16	Cardiovascular illness	CBT using imaginal exposure	Educational sessions only	Nonsignificant improvements in the CBT group, with a significant improvement in Clinical Global Scale-Severity and in PTSD symptoms in a subgroup of patients with acute unscheduled cardiovascular events and high baseline PTSD symptoms. CBT that includes imaginal exposure is safe.
17	Hematopoietic stem cell transplantation	Telephone CBT	Assessment only condition	Telephone CBT completers reported fewer illness-related PTSD symptoms, including less avoidance ( $P < 0.001$ ) and fewer intrusive thoughts ( $P < 0.05$ ) even after controlling for covariates. These results were consistent in follow-ups.
18	MVA	CBT	WL	CBT treatment proved to be highly effective in terms of PTSD symptom reduction, showed increases in post-traumatic growth subdomains "new possibilities" and "personal strength".
19	MVA	CBT	WL	Effective CBT treatment of PTSD may be accompanied by adaptive changes in asymmetrical brain function.
20	MVA	CBT	WL	Greater decrease in heart rate reactivity for CBT than for WL. The change in heart rate reactivity was associated with clinical improvement.
21	MVA	CBT	WL	Greater improvement in the CBT group as compared with the WL group (effect size $d = 1.61$ ). Categorical diagnostic data indicated clinical recovery of 67% (post-treatment) and 76% at 3 months in the CBT group.
22	MVA	CBT	SP	One-year results showed a continued significant advantage on categorical diagnosis (PTSD or not) and structured interview measures for CBT over SP.
23	MVA	Group-CBT	Minimum contact comparison group	Group CBT showed significant reductions in PTSD symptoms, both in clinical interview and self-report measures. Among treatment completers, 88.3% of group CBT relative to 31.3% of the minimum contact comparison participants did not satisfy criteria for PTSD at post-treatment. Treatment gains were maintained over a 3-month period. Patients reported satisfaction with Group CBT.
24	MVA with chronic PTSD	CBT	SP, WL	CBT was superior to WL and to SP; SP was superior to WL. Results maintained at 3 months.

(Continued)

Table 1 (Continued)

Reference	Trauma/context	Therapy	Comparator	Findings/outcome
25	PTSD in WTC disaster workers	Cognitive-behavioral exposure treatment	TAU	Relevance of a brief focused intervention comprised of CBT and exposure was established; the need to eliminate barriers to treatment retention was associated with income and education.
26	PTSD in service members following 9/11 or Iraq war	Self-management CBT	SC	Self-management CBT led to greater reductions in PTSD, depression, and anxiety scores at 6 months. One-third of those who completed self-management CBT achieved high end state functioning at 6 months.
27	Refugees	CBT	Exposure therapy	Exposure therapy and CBT led to a 48% and 53% reduction on PTSD symptoms, respectively, with no difference between them on any measure; results were maintained at the 6-month follow-up.
28	Refugees with pharmacology-resistant PTSD	Culturally adapted CBT	WL	Reduction of PTSD severity by CBT was significantly mediated by improvement in orthostatic panic and emotion regulation ability.
29	Refugees with pharmacotherapy-refractory PTSD	CBT with sertraline	Sertraline alone	Substantial gains were achieved by adding CBT to pharmacotherapy for PTSD.
30	Refugees with treatment-resistant PTSD and panic attacks	Culturally adapted CBT, initial treatment	Delayed treatment (crossover trial)	Significantly greater improvement in the initial treatment condition, with large effect sizes for all outcome measures.
31	Intimate partner violence	TF-CBT	Usual care (CCT)	Community TF-CBT effectively improves children's PTSD and anxiety related to intimate partner violence
32	Female survivors of assault	Brief CBT	Assessment condition, SC	At postintervention, and at 3-month follow-up, participants in brief CBT reported greater decreases in self-reported PTSD severity than those in SC; however around 9 months post assault, all three interventions had generally similar outcomes.
33	Female survivors of childhood sexual abuse	CBT	Problem-solving therapy (present-centered therapy; PCT), WL	CBT and PCT were superior to WL in decreasing PTSD symptoms and secondary measures. CBT had a significantly greater dropout rate than PCT and WL. Both CBT and PCT were associated with sustained symptom reduction.
34	PTSD in children and adolescents	TF-CBT	WL	Individual TF-CBT was effective for PTSD in children and young people.
35	Sexually abused children	TF-CBT + sertraline	TF-CBT + placebo	Significant improvement in both groups with no significant differences between groups except in Child Global Assessment Scale ratings, which favored the TF-CBT + sertraline group. Initial trial of TF-CBT was suggested for most children with PTSD before adding medication.
36	Sexually abused children	TF-CBT	CCT	Children treated with TF-CBT had significantly fewer symptoms of PTSD and described less shame than the children who had been treated with CCT at 6 and 12 months.
37	Sexually abused children	TF-CBT	Nondirective supportive therapy (NST)	TF-CBT group evidenced significantly greater improvement in PTSD at the 12-month follow-up.
38	Sexually abused children	TF-CBT	CCT	CBT compared with CCT, demonstrated significantly more improvement in PTSD.
39	Various trauma	Group CBT	Acupuncture, WL	Symptom reductions were similar in magnitude with CBT and acupuncture compared with WL; maintained at 3-month follow-up for both interventions.
40	Various trauma	Internet-based CBT	WL	Internet-based CBT proved to be a treatment alternative for PTSD (effect size $d = 1.40$ ) and had sustained treatment effects. A stable and positive online therapeutic relationship could be established.
41	Various trauma	CBT variant (trauma treatment protocol)	EMDR	Trauma treatment protocol was both statistically and clinically more effective in PTSD; and this was maintained and became more evident by 3-month follow-up.

**Abbreviations:** CBT-PD, cognitive behavioral therapy for postdisaster distress; CCT, child-centered therapy; EMDR, eye movement desensitization and reprocessing; ITT, intent-to-treat; MYA, motor vehicle accidents; PTSD, post-traumatic stress disorder; SC, supportive counseling; SP, supportive psychotherapy; ST, supportive therapy; TAU, treatment-as-usual; TF-CBT, trauma-focused cognitive-behavior therapy; WL, waitlist control.

imaginal reliving and facilitating of post-traumatic growth, have been used in motor vehicle accident survivors with full or subsyndromal PTSD, which has led to significant improvement that has been stable at follow-up.<sup>21</sup> Group CBT has also been studied for PTSD following a serious motor vehicle accident, with special considerations for strategies to reduce the potential for triggering re-experiencing of symptoms during group sessions. The results suggested that group CBT is an effective treatment for motor vehicle accident-related PTSD.<sup>52</sup> However, inadequate response to CBT has been reported in a proportion of cases. A 12-week course of CBT for people with motor vehicle accident-related PTSD reported a partial response in 40% of cases. Compared with responders, partial responders tended to have more severe pretreatment numbing symptoms and greater anger about their accident, along with lower global levels of functioning, greater pain severity and interference, and greater depression, and were more likely to be taking psychotropic medications.<sup>53</sup>

## Refugee status

Refugees with PTSD often present with complicated traumatic symptoms, prolonged and repeated exposure to traumatic events, acculturation, and social problems. There are many studies of CBT in refugees, suggesting its effectiveness.<sup>27</sup> Therapy issues, like adapting the CBT to the culture and language of the refugees, are challenging and have been addressed in some studies.<sup>29</sup> A program of CBT emphasizing information, exposure, and cognitive-restructuring has been successfully used in refugees.<sup>29</sup> Large effect sizes have been obtained in some of the CBT studies, indicating a broad suitability of CBT in this area.<sup>54</sup> Refugees with pharmacology-resistant PTSD have also benefitted from CBT.<sup>28</sup> In a sample of Vietnamese refugees with treatment-resistant PTSD and panic attacks, CBT indicated significant improvements for all outcome measures, ie, the Harvard Trauma Questionnaire, Anxiety Sensitivity Index, Hopkins Symptom Checklist-25 (HSCL-25)-anxiety subscale, and Hopkins Symptom Checklist-25-depression subscale scores.<sup>55</sup> In an illustrative case report, a tortured male asylum-seeker living in Sweden who received 16 sessions of CBT, involving mainly self-exposure to trauma-related cues, had significant improvement across all measures of PTSD, anxiety, and depression, which was maintained at six-month follow-up.<sup>56</sup> However, effectiveness of CBT treatments has not as yet been tested on the whole range of symptoms in refugees with maladaptive traumatic reactions that can take the shape of more complex reactions.

## Disaster workers

Disaster workers are exposed to shocking scenes and humanitarian suffering, and are particularly vulnerable to developing stress symptoms, including PTSD, in spite of their training and preparedness for disaster work. In fact, high rates of PTSD in disaster workers have been reported worldwide. Studies of CBT in this area are scarce, but there is evidence of support for the relevance of a brief focused intervention comprising CBT for disaster workers.<sup>25</sup>

## Disorders associated with PTSD

### Insomnia

Insomnia is one of the most common symptoms of PTSD and often persists after other symptoms have responded to CBT. In a study of patients who no longer met the criteria for a PTSD diagnosis following CBT for PTSD, 48% reported residual insomnia. However, for the large majority, insomnia persisted in the absence of continuing nightmares and hypervigilance. Experiencing trauma in a sleep-related context was associated with greater risk for residual insomnia.<sup>57</sup> The response of insomnia to CBT treatment has been specifically addressed in some studies. The outcome of five sessions of cognitive-behavioral treatment for insomniac patients who responded to CBT for PTSD, but continued to report insomnia, suggested improvements on subjective sleep measures and self-monitored sleep efficiency in most cases.<sup>58</sup> In one study, rape victims with PTSD who responded to CBT also had significantly decreased sleep disturbance following therapy.<sup>49</sup>

### Physical conditions

Serious physical conditions and events are linked to development of PTSD. Many studies have tried to evaluate the effectiveness of CBT in these conditions, ranging from malignancy, cardiovascular disorders, physical trauma, brain injuries, and postnatal PTSD.<sup>16,17</sup> The physical safety of CBT utilizing imaginal exposure in patients who suffer PTSD following a life-threatening cardiovascular event has been established.<sup>16</sup> In a study of myocardial infarction survivors with PTSD, it was found that PTSD symptoms and cardiovascular risk improved in patients who received CBT. PTSD was found to be a treatable risk factor for poor post-myocardial infarction outcome.<sup>59</sup> CBT has also been suggested to be the treatment of choice in PTSD secondary to intraoperative awareness with subsequent recall.<sup>60</sup> Approximately 1%–2% of women suffer from postnatal PTSD, with wide-ranging consequences for themselves and their families. CBT has been reported to be effective in postnatal PTSD.<sup>61</sup> However, there

is limited evidence concerning the management of women with PTSD after childbirth. CBT may improve PTSD in this setting, but controlled trials are needed before conclusions can be drawn.<sup>62</sup>

Injured trauma survivors are a known risk group for PTSD, and given the complex circumstances and comorbidities of this population, it is expected that PTSD might impact treatment delivery and outcome. The suitability of CBT for the treatment of injured trauma survivors with PTSD has been suggested, with special consideration of treatment delivery within the trauma care system.<sup>63</sup> There are examples of use of CBT for managing PTSD symptoms in patients with traumatic brain injury, which include use of a stress inoculation and graduated exposure to avoided situations and trauma re-experiences. Set within a neurorehabilitation program, CBT has led to improvement in PTSD symptoms and psychosocial outcome in traumatic brain injury survivors.<sup>64</sup>

### Studies involving other types of trauma

There are examples of use of CBT following natural disasters affecting huge populations.<sup>65-68</sup> It has been proposed that a randomized controlled trial of CBT for PTSD must be conducted with public health relevance and enhanced methodological rigor.<sup>69</sup> Systematic reviews have found that individual and group trauma-focused CBT is effective in the treatment of PTSD following various kinds of trauma.<sup>70</sup> Psychological treatments empirically supported for PTSD following different kinds of trauma are trauma-focused CBT and eye movement desensitization and reprocessing (EMDR), which are efficacious and specific for PTSD.<sup>51</sup>

### CBT for PTSD in children and adolescents

PTSD is a common psychiatric condition in childhood and adolescence following traumatic events.<sup>71,72</sup> CBT has been considered to be the first choice of treatment of PTSD in children and adolescents.<sup>73,74</sup> The effectiveness and feasibility of CBT have been established even for preschool children with PTSD following a range of traumatic events. It has been concluded that young children can cooperate meaningfully in structured, trauma-related exposure exercises and can utilize relaxation techniques successfully. Highly anxious parents do not inhibit their children's improvement per se, as long as they can facilitate the manual techniques.<sup>75</sup> Studies of CBT in children comparing PTSD with EMDR and play therapy are methodologically more rigorous, having used manualized, reproducible treatment, and contain examples of group-based or school-based therapies.<sup>76</sup>

In a randomized controlled trial, children and young people with PTSD who received individual trauma-focused CBT experienced significantly greater improvement in symptoms not only of PTSD, but also depression and anxiety, with significantly better functioning compared with wait-list. While 92% of participants no longer met criteria for PTSD after CBT, this figure was 42% in the wait-list group. CBT gains were maintained at six-month follow-up.<sup>34</sup> An 18-week, group-administered course of CBT for pediatric PTSD after a single-incident stressor reported that the majority of patients (82.4%) completed treatment. Of these, 57% no longer met the criteria for PTSD immediately after treatment, and 86% were free of PTSD at six-month follow-up. CBT produced a robust beneficial effect after treatment on the Clinician-Administered PTSD Scale-Child and Adolescent Version, with additional improvement accruing at follow-up on ITT analyses.<sup>77</sup>

### Natural disasters

The efficacy of CBT in alleviating symptoms of PTSD after catastrophic disaster has been demonstrated in children and adolescents.<sup>66,78</sup> Following the 1999 earthquake in Athens, short-term CBT in a group of children who were experiencing PTSD symptoms revealed a significant reduction in overall symptoms across intrusion, avoidance, and arousal symptom clusters, as well as in depressive symptoms immediately after the intervention. The therapy also produced a significant improvement in children's psychosocial functioning. Further significant improvement was reported at 18-month follow-up, which was maintained at four-year follow-up. This study suggested that short-term group CBT can be offered in clinical settings, particularly if resources are limited.<sup>79</sup> CBT for adolescents exposed to the 2004 earthquake in Bam, Iran, led to a significant decrease in severity of PTSD symptoms in each of three symptom categories (intrusion, avoidance, and arousal) and in the total score for PTSD.<sup>66</sup>

### Man-made traumas

A growing number of studies of child abuse victims have supported the effectiveness of trauma-focused CBT.<sup>80</sup> A review article found that promising treatments for war-related PTSD in refugee children and adolescents include CBT, testimonial psychotherapy, narrative exposure therapy, and EMDR.<sup>81</sup> A school mental health program consisting of manual-based, eight-session, group CBT delivered by bilingual, bicultural school social workers, supported Latino immigrant students who had been exposed to community violence.

The outcome was a modest decline in trauma-related mental health problems. This study demonstrated that programs for traumatized youth can be designed for delivery on school campuses by school clinicians, and can be implemented and evaluated in the school setting.<sup>82</sup> In a study of Palestinian adolescent victims of armed conflict, it was suggested that trauma-focused CBT addressing negative coping and fatalism may yield positive results.<sup>83</sup> More research is needed to determine the critical components and optimal administration of CBT and to evaluate the efficacy of this approach for other groups of child crime victims.

## Sexual abuse

There is growing evidence supporting the effectiveness of trauma-focused CBT in children suffering PTSD as a result of sexual abuse.<sup>36,38</sup> Trauma-focused CBT for symptomatic children has been successful within 1–6 months of experiencing sexual abuse. Several controlled and open-label studies of traumatized children with chronic PTSD have provided additional support for trauma-focused CBT interventions. However, the optimal dosage and critical components of trauma-focused CBT have not been determined.<sup>84</sup> A family-wide CBT framework for sexually abused children with PTSD that involves both child and nonoffending caregivers has been found to be supportive.<sup>85</sup> Compared with child-centered therapy, trauma-focused CBT has demonstrated significantly more improvement with regard to PTSD, depression, behavior problems, shame, and abuse-related attributions in sexually abused children. Similarly, parents/caregivers who receive trauma-focused CBT show greater improvement with respect to their own self-reported levels of depression, abuse-specific distress, support of the child, and effective parenting practices.<sup>36,38</sup>

## CBT for PTSD as a comorbid psychiatric condition

PTSD is often observed as a comorbidity of other psychiatric disorders, most commonly depressive or anxiety disorders. Comorbidity of PTSD impacts upon the outcome unless it is identified and addressed. In acute PTSD patients with baseline comorbid major depression, brief early CBT has been observed to lower PTSD scores significantly, both at one week and at four months.<sup>11</sup> A study comprising PTSD patients with comorbidity of major mood disorder (85%) or schizophrenia or schizoaffective disorder (15%), of whom 25% also had borderline personality disorder, reported a CBT participation rate of 81%. CBT patients improved significantly more than did patients on treatment

as usual at blinded post-treatment and three-month and six-month follow-up assessments of PTSD symptoms, negative trauma-related beliefs, perceived health, and knowledge about PTSD. The findings suggest that clients with severe mental illness and PTSD can benefit from CBT, despite severe symptoms, suicidal thinking, psychosis, and vulnerability to hospitalization.<sup>15</sup> Co-occurring PTSD is a known risk factor for negative outcomes in the treatment for substance use disorders. However, a favorable response has been reported for substance use, PTSD severity and retention in patients who received CBT for comorbid PTSD provided by community therapists in this patient group.<sup>86</sup>

## Comparisons with other psychotherapies

Various forms of therapies have been compared with CBT in the treatment of PTSD, namely supportive psychotherapy, problem-solving therapy, present-centered therapy, psychodynamic therapy, hypnotherapy, acupuncture, and structured writing therapy.<sup>12,13,39</sup> However, more consistent comparison has been with EMDR. A systematic review of 23 clinical trials on the efficacy of CBT in comparison with other psychotherapies suggested that CBT had better remission rates than EMDR or supportive therapies. CBT was comparable with exposure therapy and cognitive therapy in terms of efficacy and compliance. These findings suggested that specific therapies, such as CBT, exposure therapy, and cognitive therapy are equally effective, and more effective than supportive techniques in the treatment of PTSD.<sup>87</sup> Another systematic review of 33 randomized controlled trials compared all psychological treatments for adults suffering from traumatic stress symptoms for three months or more. Types of interventions studied were trauma-focused CBT/exposure therapy, stress management, other therapies (supportive therapy, nondirective counseling, psychodynamic therapy, and hypnotherapy), group CBT, and EMDR. With regard to reduction of clinician-assessed PTSD symptoms measured immediately after treatment, trauma-focused CBT did significantly better than other therapies and wait-list/usual care. There is no significant difference between trauma-focused CBT and stress management, trauma-focused CBT, and EMDR. Group trauma-focused CBT was significantly better than wait-list/usual care. It was concluded that individual and group trauma-focused CBT, EMDR, and stress management are effective in the treatment of PTSD. There was some evidence that individual trauma-focused CBT and EMDR are superior to stress management in the treatment of PTSD at 2–5 months following treatment.<sup>70</sup>

## Eye movement desensitization and reprocessing

EMDR and trauma-focused CBT are both widely used in the treatment of PTSD and have been consistently compared. While most studies find them better than other therapies, and equally efficacious; there are studies which suggest superiority of CBT over EMDR.<sup>41</sup> A systematic review of 38 randomized controlled trials reported that trauma-focused CBT, EMDR, stress management, and group CBT improved PTSD symptoms more than wait-list or usual care. There was inconclusive evidence regarding other therapies. There was no evidence of a difference in efficacy between trauma-focused CBT and EMDR, but there was some evidence that trauma-focused CBT and EMDR were superior to stress management and other therapies. The results suggested that the first-line psychological treatment for PTSD should be trauma-focused CBT or EMDR.<sup>88</sup> A meta-analysis of seven studies suggested that trauma-focused CBT and EMDR tend to be equally efficacious, and superiority of one treatment over the other could not be demonstrated.<sup>89</sup>

## Nonresponse to CBT

Nonresponse and dropouts are common in CBT for PTSD, and many patients fail to attain remission with it.<sup>90</sup> A review of 55 studies found that the nonresponse rates could be as high as 50%.<sup>91,92</sup> Dropout rates ranged widely, and may have depended, at least in part, on the nature of the study population.<sup>91</sup> It is essential to discuss the potential factors associated with nonresponse. In a clinical setting, the completion rate for CBT has been observed to be markedly lower than rates reported in randomized trials. CBT completion was inversely related to severity of overall pretreatment measures of PTSD, avoidance, hyperarousal, depression, impaired social functioning, and borderline personality disorder. In one particular study, initiating imaginal exposure therapy was associated with greater likelihood of completion.<sup>93</sup> The dropout of disaster workers after the World Trade Center attack was associated with lower income, less education, and higher alcohol consumption. There is a need to eliminate barriers to treatment retention.<sup>25</sup> Partial response in cases of motor vehicle accident-related PTSD was associated with more severe pretreatment numbing, greater anger regarding motor vehicle accident, lower global level of functioning, greater pain severity, and greater depression.<sup>53</sup>

## CBT and long-term outcome

There are many follow-up studies which have looked into the long-term effect of CBT in PTSD patients.

Continued significant advantage on categorical diagnosis (PTSD or not) and structured interview measures for CBT over supportive psychotherapy at one year has been reported. At two years, although there were continued differences favoring CBT over supportive psychotherapy, only the differences in the PTSD Checklist, Impact of Event Scale scores, and overall categorical diagnoses were significant. There was very modest improvement from end of treatment to the two-year follow-up.<sup>22</sup> In another study, two years after six sessions of CBT, CBT combined with hypnosis, or supportive counseling, civilian trauma survivors with acute stress disorder who received CBT and CBT-hypnosis reported less re-experiencing and less avoidance symptoms than patients who received supportive counseling. In terms of treatment completers, 10% of CBT patients, 22% of CBT-hypnosis patients, and 63% of supportive counseling patients met PTSD criteria at two-year follow-up. Considering the ITT analyses, the corresponding figures were 36%, 46%, and 67%, respectively.<sup>94</sup>

A follow-up study of civilian trauma survivors with acute stress disorder reported that 8% of CBT patients and 25% of supportive counseling patients met criteria for PTSD four years after the therapy. Patients who received CBT reported less intense PTSD symptoms, and particularly less frequent and fewer avoidance symptoms, than patients who received supportive counseling. These findings suggest that early provision of CBT in the initial month after trauma has long-term benefits for people who are at risk of developing PTSD.<sup>95</sup> However, in an assessment of the long-term outcome of a randomized controlled trial of CBT for anxiety disorders, it was observed that patients with PTSD fared particularly poorly. Treatment with CBT was associated with a better long-term outcome than non-CBT in terms of overall symptom severity but not with regard to diagnostic status. The positive effects of CBT in the original trial eroded over longer time periods. CBT was associated with slightly higher costs than non-CBT and slightly higher benefits.<sup>96</sup>

## CBT and prevention

The prevention of long-term psychological distress following traumatic events is a major concern. It is already known that current evidence does not support psychological debriefing for prevention of PTSD.<sup>97,98</sup> Acute stress disorder is considered as a precursor of chronic PTSD. In a comparative study, patients with acute stress disorder were given five sessions of either CBT or supportive counseling within two weeks of civilian trauma. Fewer patients in the CBT group than those in the supportive counseling group



(8% versus 83%) met the criteria for PTSD following treatment. There were also fewer cases of PTSD in the CBT condition (17%) than in the supportive counseling condition (67%) six months following the trauma. There were greater statistically and clinically significant reductions in intrusive, avoidance, and depressive symptomatology among the patients receiving CBT than in those receiving supportive counseling. This study not only demonstrated successful treatment of acute stress disorder with CBT but also its efficacy in preventing chronic PTSD.<sup>99</sup> However, in another study, a brief CBT program given in the first month after trauma was not superior to repeated assessment, but a course of CBT of up to 16 sessions given at 1–4 months after trauma was superior to self-help, repeated assessment, and no intervention. The reasons for this superior response include the way of working through traumatic memories and the impact of the interventions on patient interpretation of PTSD symptoms.<sup>100</sup>

There is evidence from a meta-analysis of five randomized controlled trials for the superior effectiveness of trauma-focused CBT within three months of trauma compared with supportive counseling in preventing chronic PTSD in patients with an initial acute stress disorder diagnosis. However, considering the limitations, replications are necessary to assess generalizability. Evidence for the effectiveness of trauma-focused CBT in traumatized populations without an acute stress disorder diagnosis can be considered to be insufficient.<sup>101</sup> Another study indicated that multiple-session trauma-focused CBT beginning within three months of a trauma appeared to be effective for individuals with traumatic stress symptoms, especially those who meet the threshold for a clinical diagnosis.<sup>102</sup>

It is known that military personnel, emergency responders, disaster workers, and others whose work environments include exposure to traumatic events are at risk of developing PTSD. Possible cognitive-behavioral mechanisms in trauma adaptation and prevention interventions for at-risk professionals have been proposed based on current findings for CBT and empirical research on post-traumatic stress.<sup>103</sup> It appears that early trauma-focused CBT holds promise as a preventive intervention for people at risk of developing chronic PTSD. The population impact of a preventive intervention depends on two factors, ie, what proportion of the full population at risk receives the intervention and how large a reduction in risk occurs among those who receive it. In an illustrative study, CBT demonstrated a larger effect size (50% PTSD prevention), but minimal reach (27/10,000), while a stepped collaborative care trial demonstrated a smaller effect size

(7% PTSD prevention) but greater reach (1762/10,000). Modeling of the population impact suggested that a 9.5-fold greater cumulative reduction in the incidence of PTSD would result from the dissemination of the collaborative care broad reach prevention strategy.<sup>104</sup>

However, it is suggested that, at present, multiple session interventions aimed at all individuals exposed to traumatic events should not be used.<sup>105</sup> A review and meta-analysis suggested that no psychological intervention can be recommended for routine use following traumatic events for prevention of PTSD, and that multiple session (two or more sessions) interventions, like single session interventions, may have an adverse effect on some individuals.<sup>105</sup>

## Pharmacotherapy-CBT interface

A systematic review has investigated whether or not the combination of psychological therapy and pharmacotherapy is a more efficacious treatment for PTSD than either of these interventions delivered separately. There was no strong evidence to show differences between the group receiving combined intervention compared with the group receiving psychological therapy or pharmacotherapy.<sup>106</sup> However, it has been suggested that combining medication approaches with psychotherapies that promote extinction, such as CBT, may offer patients with PTSD a rapid and robust treatment with good durability of effect.<sup>107</sup> In a similar vein, CBT seems to be a promising next-step strategy for patients with PTSD who did not remit with drug-based therapies.<sup>108</sup> In a sample of pharmacotherapy-refractory Cambodian refugees, combination treatment with sertraline and CBT for treating PTSD indicated substantial gains.<sup>29</sup> However, another study found only minimal evidence for a combination of trauma-focused CBT and sertraline, and suggested an initial trial should be undertaken, with evidence-based psychotherapy before adding medication.<sup>31</sup> Key recommendations of Australian clinical practice guidelines for PTSD indicate that medication should not be used in preference to trauma-focused psychological therapy (CBT or EMDR).<sup>9</sup>

## Methodological issues using CBT

### Cultural issues

CBT has been used across cultures successfully, but needs to be adapted according to cultural and local issues.<sup>29,109</sup> In the context of natural disasters, as well as psychiatric disorders, CBT has been found to be effective in many countries.<sup>109</sup> Culturally adapted CBT in Vietnamese and Cambodian refugees with PTSD has been feasible, acceptable, and effective.<sup>55</sup>

## Training

Studies suggest that community therapists can be trained in CBT for postdisaster distress in relatively short time spans with ongoing support in a real-world setting. This is especially important in emergency disaster situations, when a number of nonexpert trauma therapists will need to deliver trauma services<sup>67</sup> to large numbers of people.<sup>110</sup> The effectiveness of disseminating CBT for postdisaster distress to community therapists was studied following Hurricane Katrina. Following two days of training in CBT for postdisaster distress, therapists showed significant improvement in their ratings of the importance of various elements of CBT, their knowledge and understanding of those elements, and their confidence that they could use them effectively. Immediately following training, 90% of therapists demonstrated excellent retention of CBT for postdisaster distress.<sup>67</sup> CBT for postdisaster distress, comprising 10 sessions, provided by community therapists addressing a range of cognitive, emotional, and behavioral reactions to disaster in adult survivors of Hurricane Katrina has been reported to be effective. Participants who were assessed at various phases of treatment showed significant and large improvements. The overall pre-post effect size was 1.4 in ITT analyses, and the benefits were maintained at follow-up.<sup>68</sup>

## Components of CBT

CBT in the context of PTSD usually entails education about common reactions to trauma, relaxation training, and identification and modification of cognitive distortions. However, many specific elements have been used. Some of these involve imaginal reliving of the trauma memory, imaginal exposure, in vivo exposure, facilitation of post-traumatic growth,<sup>21</sup> stress inoculation, graduated exposure to avoided situations and trauma re-experiences,<sup>64</sup> exposure to trauma reminders, cognitive restructuring, and rescripting/imagery rescripting.<sup>11,111</sup> Cognitive behavior interventions in older children have included direct discussion of the trauma, desensitization and relaxation techniques, and cognitive reframing. Contingency reinforcement programs for problematic behaviors have been suggested to be useful.

## Therapy settings

CBT for PTSD has been provided in a variety of settings, including community centers, schools, primary care clinics, and hospitals at secondary and tertiary care levels, depending upon the context of the traumatic event or condition. For example, following natural disasters, CBT has been used in community centers and schools by community therapists,

and the effectiveness of this method of CBT provision has been established. Considering the therapy sessions, CBT for PTSD is usually delivered in weekly or biweekly sessions.<sup>11</sup> However, an intensive version of cognitive therapy for PTSD has recently been attempted. Patients received up to 18 hours of therapy over a period of 5–7 working days, followed by one session per week and up to three follow-up sessions. The results suggested that intensive cognitive therapy for PTSD was a feasible and promising alternative to weekly treatment. However, this warrants further evaluation in randomized trials.<sup>112</sup>

## Use of the Internet

Recently, there have been studies exploring the provision of CBT via the Internet, and suggesting that this is a viable treatment alternative for PTSD.<sup>40</sup> Online treatment of PTSD patients with therapist support by email only has been reported. An open trial involving a 10-week Internet-based therapist-assisted CBT for PTSD (PTSD Online) found that the participants showed clinically significant reductions in PTSD severity and symptomatology, moderate tolerance of the program content, and high therapeutic alliance ratings.<sup>1</sup> In another analysis of PTSD Online participants, significant improvements in PTSD severity and PTSD symptomatology were observed at post-assessment and were maintained at three-month follow-up. At post-assessment, 69.2% of the sample showed clinically significant improvement versus 77% of the sample at follow-up assessment. Overall, treatment satisfaction was good (69%), participant therapeutic alliance ratings were high (87.5%), and the average total therapist time required was 194.5 minutes.<sup>113</sup> The results of CBT administered for PTSD by video conference compared with the face-to-face method showed a significant decline in the frequency and severity of post-traumatic symptoms after both treatments and without significant differences. A clinical improvement in overall functioning was also observed.<sup>114</sup>

## CBT methods in children

Trauma-focused CBT, an evidence-based practice for children, is being disseminated and implemented through a variety of strategies, including distance learning/Internet training, live training in addition to ongoing phone consultation, a learning collaborative model, and mixed models. It has been used to spread the trauma-focused CBT model among community clinicians treating traumatized children. Data from these dissemination/implementation models vary, but overall they support the effectiveness of both the

trauma-focused CBT model in treating traumatized children and a variety of dissemination and implementation models.<sup>115</sup> Short-term group CBT has been found to be a useful treatment approach with long-term benefit. Significant improvement was reported in children at 18-month follow-up, with treatment gains being maintained at four-year follow-up.<sup>79</sup> It has been suggested that, where appropriate, families should be involved in the treatment of PTSD in children and young people.<sup>6</sup> In adolescents with PTSD, CBT has been provided in school-based treatment programs using manualized CBT intervention delivered in a group format. It has been found that this method of delivering CBT for 10 weeks has the potential to help some children who experience PTSD symptoms and depression.<sup>116</sup> Large-scale community projects to provide CBT for children and adolescents following major disasters have been attempted, eg, the Child and Adolescent Trauma Treatments and Services Consortium following the 9/11 World Trade Center disaster. Treatments were delivered in either school or clinic settings by clinicians in New York City. All participating clinicians were trained to use the CBT models and received case consultation for 18 months by expert clinician consultants and the treatment developers.<sup>117</sup> This exercise can provide a model for implementing CBT in communities following massive disasters.

## Mechanisms of change

The mechanisms behind the effectiveness of CBT for PTSD are still poorly understood. It is essential to discuss the current understanding of various mechanisms behind the effectiveness of CBT in PTSD. Both psychological and biological factors are discussed.

## Theoretical understanding

Various cognitive distortions are seen in PTSD, depending on the traumatic experience and the nature of the psychological state of the person. Common cognitive distortions include perceiving the world as dangerous, seeing oneself as powerless or inadequate, or feeling guilty about outcomes that could not have been prevented.<sup>118</sup> Many survivors feel guilty, thinking that they could have done more to limit the damage, or prevent injury or death in near and dear ones, and may have suicidal ideation.<sup>119,120</sup> A study has also indicated that PTSD is associated with negative beliefs about self that may influence self-esteem and interpersonal relationships.<sup>121</sup> PTSD often co-occurs with depression, and they may share common risk factors. One possible common cognitive risk factor is hopelessness. In a study of female survivors of interpersonal violence, relationships between hopelessness

and symptoms of PTSD were due almost entirely to shared variance with depression.<sup>122</sup>

Cognitive therapy is based on an underlying theoretical rationale that an individual's affect and behavior are largely determined by the way he/she thinks and structures the world around him/her.<sup>123</sup> CBT addresses the twin issues of lack of control and the unpredictability inherent in traumatic situations.<sup>7</sup> Victims generally begin to experience improvement in symptoms and behavior as they begin to think and act more realistically and adaptively with regard to their situational and psychological difficulties. In adults, children, and adolescents with PTSD, the effects of CBT have been observed to be partially mediated by changes in maladaptive cognitions, as predicted by cognitive models of PTSD.<sup>34</sup> It has been proposed that successful processing of traumatic events involves emotional engagement with the trauma memory, organization of the trauma narrative, and correction of dysfunctional cognitions that often follow trauma.<sup>124</sup> Imagery rescripting has long been part of CBT, especially for patients who struggle with distressing, intrusive imagery. Studies now explore a variety of imagery rescripting techniques in the treatment of PTSD.<sup>125</sup> One study investigated trauma processing during and after CBT consisting of imaginal exposure combined with rescripting. The results suggested that imaginal reliving during CBT is not crucial for symptom reduction, but it may promote conceptual processing, which in itself predicts a better treatment outcome for PTSD.<sup>111</sup>

Prolonged exposure has been reported to be effective for improving post-traumatic stress symptoms in 60%–65% of trauma victims suffering from PTSD. However, a simple habituation model (on which prolonged exposure is based) is observed to be insufficient to address non-fear emotions (eg, guilt, shame, anger) in PTSD. In contrast, by adding an imagery-based, cognitive restructuring component (imagery rescripting and reprocessing therapy) to the treatment of patients of PTSD who have failed to improve with prolonged exposure alone, 78.3% of clients showed full recovery from their PTSD symptoms and no longer met criteria for PTSD after 1–3 sessions of imagery rescripting and reprocessing therapy. It suggests that individualized trauma assessments should be conducted for each patient to identify the predominant trauma-related emotions and cognitions which will help to find the best CBT “treatment fit” for the specific trauma characteristics of each patient.<sup>126</sup>

## Biological underpinnings

It is interesting to note that CBT has been found to have an impact on the physiological parameters associated

with PTSD, suggesting improvement. Many studies have explored these areas, and reported a greater decrease of heart rate reactivity<sup>20</sup> and improvement of systolic blood pressure response to orthostasis after CBT in PTSD patients.<sup>28</sup> CBT also affects the startle response in PTSD. A significant reduction in electromyographic reactivity to all stimuli was observed in motor vehicle accident survivors who received active treatment, either CBT or supportive therapy, compared with wait-list controls. Based on this, startle responses have been suggested as a PTSD treatment outcome index.<sup>127</sup> Neuropsychological functioning in individuals with PTSD and their response to CBT has been studied. A study reported that nonresponders to treatment had significantly poorer performance on measures of verbal memory compared with responders and also demonstrated narrative encoding deficits. Verbal memory deficits seem to diminish the effectiveness of CBT and should be considered in its implementation.<sup>128</sup>

In another study involving motor vehicle accident survivors, there was a greater reduction of right anterior activation of spontaneous electroencephalographic activity in the CBT group as compared with wait-list controls following treatment. Across both groups, PTSD symptom reduction was significantly and positively correlated with a decrease in right anterior activation to the trauma stimulus.<sup>19</sup> One study examined functional magnetic resonance imaging responses of the brain pre-post CBT in individuals with PTSD. Poor improvement after treatment was associated with greater bilateral amygdala and ventral anterior cingulate activation in response to masked fearful faces. This excessive amygdala response to fear may reflect difficulty in managing anxiety reactions elicited during CBT, and this factor may limit optimal response to therapy.<sup>92</sup>

## Conclusion

The current review suggests that CBT is an effective treatment for both acute and chronic PTSD, with both short-term and long-term benefit, following a range of traumatic experiences. It has been found to be at least as effective as various other psychological interventions. CBT has been used in children and adolescents suffering from PTSD, even in preschoolers, with positive outcomes. CBT has been culturally validated, and has been used successfully by community therapists following brief training, in individual and group settings. In addition to the traditional face-to-face and group settings, there has been increasingly effective use of the technique via the Internet. In spite of reports of efficacy in many studies, nonresponse to CBT for PTSD can be as high as 50%. This is contributed to by various factors, including comorbidities and nature of the study population.

Current evidence suggests both a psychological and neurophysiological basis for the response to CBT. The preventive potential of CBT for PTSD has been recognized, when instituted early in at-risk populations. However the evidence for definitive recommendations is not satisfactory. There is a need for more studies in developing countries following disasters that affect huge populations. CBT for PTSD following massive disasters should be studied with high methodological rigor given its public health importance. The preventive potential of early CBT needs further confirmation, considering the enormous number of at-risk individuals.

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