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# The Effectiveness of Interventions to Reduce Psychological Harm from Traumatic Events Among Children and Adolescents

## A Systematic Review

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**Abstract:** Children and adolescents in the U.S. and worldwide are commonly exposed to traumatic events, yet practitioners treating these young people to reduce subsequent psychological harm may not be aware of—or use—interventions based on the best available evidence. This systematic review evaluated interventions commonly used to reduce psychological harm among children and adolescents exposed to traumatic events. *Guide to Community Preventive Services (Community Guide)* criteria were used to assess study design and execution. Meta-analyses were conducted, stratifying by traumatic exposures.

Evaluated interventions were conducted in high-income economies, published up to March 2007. Subjects in studies were  $\leq 21$  years of age, exposed to individual/mass, intentional/unintentional, or manmade/natural traumatic events.

The seven evaluated interventions were individual cognitive-behavioral therapy, group cognitive behavioral therapy, play therapy, art therapy, psychodynamic therapy, and pharmacologic therapy for symptomatic children and adolescents, and psychological debriefing, regardless of symptoms. The main outcome measures were indices of depressive disorders, anxiety and posttraumatic stress disorder, internalizing and externalizing disorders, and suicidal behavior.

Strong evidence (according to *Community Guide* rules) showed that individual and group cognitive-behavioral therapy can decrease psychological harm among symptomatic children and adolescents exposed to trauma. Evidence was insufficient to determine the effectiveness of play therapy, art therapy, pharmacologic therapy, psychodynamic therapy, or psychological debriefing in reducing psychological harm.

Personnel treating children and adolescents exposed to traumatic events should use interventions for which evidence of effectiveness is available, such as individual and group cognitive-behavior therapy. Interventions should be adapted for use in diverse populations and settings. Research should be pursued on the effectiveness of interventions for which evidence is currently insufficient.

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### Introduction

This review assesses a range of interventions intended to reduce psychological harm from traumatic events among children, adolescents, and young adults (i.e., people  $\leq 21$  years old, referred to in

this review as “children and adolescents”). A traumatic event is one in which a person experiences or witnesses actual or threatened death or serious injury, or a threat to the physical integrity of self or others.<sup>1</sup> Trauma may take the form of single or repeated events, which are natural or manmade (e.g., tsunami or bombing) and intentional or unintentional (e.g., rape versus car crashes or severe illness). Traumatic exposures may have only transient effects or result in no apparent harm. However, traumatic exposures may also result in psychological harm such as anxiety disorders and symptoms, including posttraumatic stress disorder (PTSD) and PTSD symptoms; depressive disorders and symp-

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toms; externalizing disorders and symptoms (e.g., acting out, aggressive and impulsive behavior); internalizing disorders and symptoms (e.g., withdrawn, depressed, or fearful behavior); suicidal ideation or behavior; substance abuse; and childhood traumatic grief or complicated grief. Reactions to trauma may appear immediately after the traumatic event, or weeks or months later. Many children and adolescents who have been exposed to traumatic events show a loss of trust in adults and fear of the event recurring. Other reactions vary according to age.

This study reviewed seven interventions used to reduce psychological harm to children and adolescents following traumatic exposures: individual and group cognitive-behavioral therapy (CBT), play therapy, art therapy, pharmacological therapy, psychodynamic therapy, and psychological debriefing. The interventions reviewed are common mental health and medical responses for children and adolescents who have experienced public health disasters and other types of trauma,<sup>2</sup> and vary in approach. With the exception of psychological debriefing, these interventions are most often implemented for children and adolescents who manifest symptoms following traumatic exposures. The characteristics and components of interventions overlap, and researchers may differ in the categorization of approaches.

Exposure to traumatic events such as physical abuse, sexual abuse, witnessing domestic violence, community violence, and natural disasters are common among children in the U.S.<sup>3</sup> According to a nationally representative sample of children aged 2 to 17 years surveyed in late 2002 and early 2003, one in eight children experienced a form of child maltreatment (including abuse, neglect, bullying, or abduction by a caretaker); one in 12 experienced sexual victimization; and more than one in three witnessed violence or experienced another form of indirect victimization (e.g., the murder of a parent not observed by the child).<sup>4</sup> Those who had been victimized reported an average of three separate types of victimization (e.g., sexual abuse, physical abuse, and bullying).<sup>4</sup> Only 29% of the children surveyed had not experienced direct or indirect victimization during the past year.

For most traumas, the majority of children exposed appear to be unharmed or only transiently affected, as measured by standard instruments.<sup>5,6</sup> Rates of PTSD and PTSD symptoms may vary by traumatic exposure: 60% of children exposed to a sniper attack met PTSD criteria one year after the incident,<sup>7</sup> and studies of urban youth exposed to community violence report PTSD rates from 24% to 34.5%.<sup>8</sup> It has been estimated that 60% of sexually abused children (one of the traumas most likely to result in harm) exhibit symptoms.<sup>6</sup> The characteristics differentiating those who suffer harm following traumatic exposure from those who do not are incompletely understood.<sup>6</sup>

Risk factors for PTSD in children include severity of the traumatic exposure, temporal proximity to the traumatic event, and trauma-related parental distress.<sup>8</sup> The ability of parents and other significant adults to cope with trauma is a strong predictor of a positive outcome for children following traumatic events.<sup>8</sup>

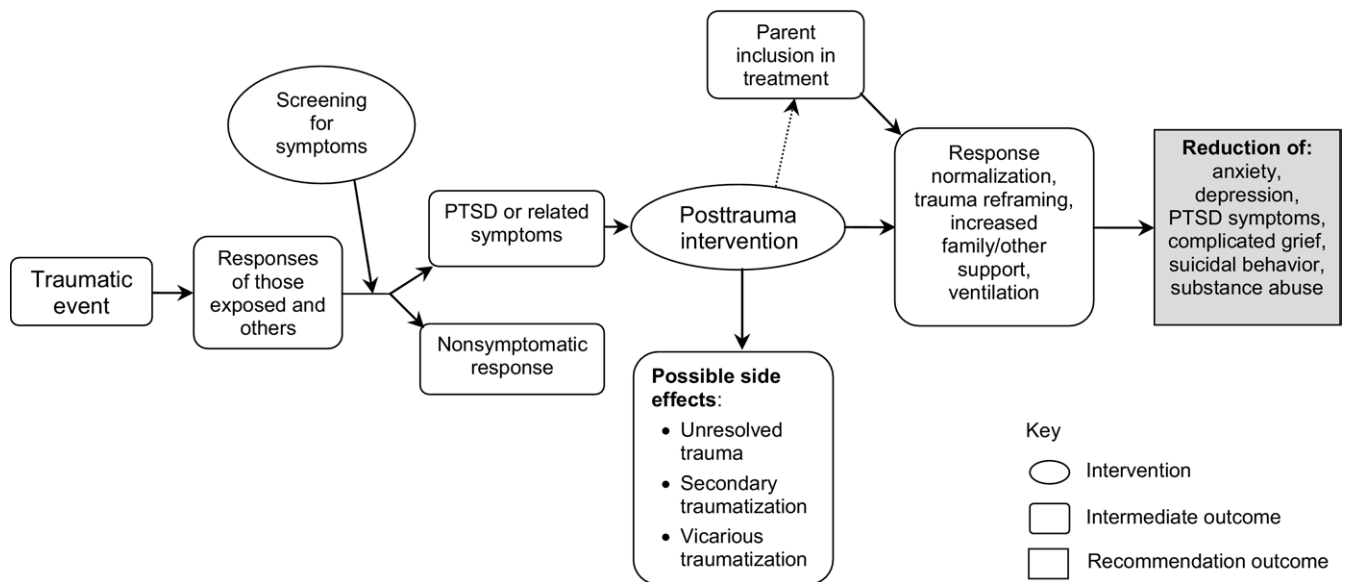
Substantial evidence shows that exposure to traumatic experiences can affect brain function in several ways, and may have long-lasting consequences.<sup>9</sup> Trauma directly affects the stress reaction to dangerous and threatening events, as well as emotional reactions and memories. The persistence of these reactions has been associated with altered brain anatomy and physiological function, including the size of brain glands and secretory patterns.<sup>10</sup> These, in turn, affect memory, attention, and other mental functioning in children and adolescents as well as in adults.<sup>10</sup>

Traumatic exposures may lead to other health consequences as well, including depression, anxiety, and other mental health conditions; risk-taking behavior; and chronic physical disorders.<sup>11,12</sup> Exposure to trauma also increases the likelihood of social problems among children, such as substance abuse, dropping out of school, and low occupational attainment and employment disability.<sup>13,14</sup>

Approaches taken in the treatment of traumatized children with PTSD or PTSD symptoms vary widely. In a 1998–1999 survey by the American Academy of Child and Adolescent Psychiatry and the International Society for Traumatic Stress Studies, the treatment preferred by most psychiatrists was pharmacotherapy (20.4%); for other clinicians, the preferred treatment was cognitive behavioral therapy (22.6%).<sup>2</sup>

Given the high rates of exposure to traumatic events among children and adolescents and the potential for long-term consequences of such exposures when untreated, this review assessed several common interventions to determine which interventions are effective in reducing the harms of traumatic exposures, which are ineffective, and which have not yet been adequately studied. Some may be overused in the absence of evidence of effectiveness, while others may be effective yet underused.

The conceptual model, or analytic framework (Figure 1) used to evaluate the effectiveness of interventions in reducing psychological harm depicts the flow of influences, beginning with the traumatic exposure; its immediate consequence; screening processes that may lead to receipt of the intervention; through mediating processes (e.g., response normalization, trauma reframing); to mental health outcomes of interest (e.g., reduction of anxiety, depression, PTSD). Screening is a stage in all of the interventions reviewed with the exception of psychological debriefing, in which anyone exposed to a traumatic event may participate, regardless of the presence of symptoms. Also shown in the framework are possible negative side effects, such as



**Figure 1.** Analytic framework: reducing psychological harm among children and adolescents following trauma

vicarious traumatization (in which a person is traumatized by hearing about or being otherwise exposed to another person's traumatic experience) and secondary traumatization (in which participants revisit their trauma and are traumatized by the revisit).<sup>15</sup> The intervention may involve the child's parent either in treatment with the child or in separate treatment, and this parental involvement may contribute to the outcome by enhancing parent-child relations.

## Methods

The general methods for conducting systematic reviews for the *Community Guide* have been described in detail elsewhere.<sup>16,17</sup> The process used to review evidence systematically and then translate that evidence into conclusions involves forming a systematic review development team; developing a conceptual approach to organizing, grouping, and selecting interventions to evaluate; searching for and retrieving evidence; assessing the quality of and abstracting information from each study; assessing the quality of and drawing conclusions about the body of evidence of effectiveness; and translating the evidence of effectiveness into recommendations.

## Search for Evidence

Electronic searches for literature were conducted in the MEDLINE; EMBASE; ERIC; NTIS (National Technical Information Service); PsycINFO; Social Sciences Abstracts; and NCJRS (National Criminal Justice Reference Service) databases for all dates up to March 2007. Search terms included the generic and specific terms for treatments, different forms of trauma, and terms such as *evaluate*, *effective*, and *outcome*. Also reviewed were the references listed in all retrieved articles; researchers also consulted with experts on the systematic review development team and elsewhere for additional studies. Studies published as journal articles, government reports, books, and book chapters were considered.

An article was considered for inclusion in the systematic review if it had the following characteristics:

- evaluated one of the specified interventions on children or adolescents (i.e., median age  $\leq 21$  years);
- was conducted in countries with high-income economies as defined by the World Bank (i.e., with a Gross National Income per capita of \$11,116 or more)<sup>a</sup>; the focus of most *Community Guide* reviews is the U.S. setting, so it is generally appropriate to limit studies to those conducted in high-income countries;
- was published before March 2007;
- assessed at least one of the following common psychological consequences of exposures to trauma<sup>18–20</sup>:
  - PTSD symptoms and PTSD (forms of anxiety related to traumatic exposures)
  - other anxiety disorders and symptoms
  - depressive disorders and symptoms
  - externalizing disorders and symptoms (disruptive behavioral problems directed toward the environment and others,<sup>21</sup> such as acting out, being persistently aggressive, impulsive)
  - internalizing disorders and symptoms (emotional problems directed toward inner experience,<sup>21</sup> such as being withdrawn, depressed, fearful)

<sup>a</sup>Countries with high-income economies (as defined by the World Bank) are Andorra, Antigua and Barbuda, Aruba, Australia, Austria, The Bahamas, Bahrain, Barbados, Belgium, Bermuda, Brunei Darussalam, Canada, Cayman Islands, Channel Islands, Cyprus, Czech Republic, Denmark, Estonia, Faeroe Islands, Finland, France, French Polynesia, Germany, Greece, Greenland, Guam, Hong Kong (China), Iceland, Ireland, Isle of Man, Israel, Italy, Japan, Republic of Korea, Kuwait, Liechtenstein, Luxembourg, Macao (China), Malta, Monaco, Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Norway, Portugal, Puerto Rico, Qatar, San Marino, Saudi Arabia, Singapore, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, the U.S., Virgin Islands (U.S.).

- suicidal ideation and behavior
- substance abuse
- was a primary study rather than a guideline or review;
- included a comparison group without intervention or with delayed or lesser doses of the intervention; or, in a single cohort, included a period without exposure, followed by exposure, followed by removal of the exposure.<sup>22</sup>

### Abstraction and Evaluation of Individual Studies

Each study that met the inclusion criteria was read by two reviewers who used standardized criteria to record information from the study and to assess the suitability of the study design and threats to validity for purposes of the review.<sup>16,17</sup> Disagreements between the reviewers were reconciled by consensus among the team members.

Each study was assessed for standard features of design and execution. Studies classified as having greatest design suitability were those in which data on exposed and control groups were collected prospectively; studies classified as having moderate design suitability were those in which data were collected retrospectively or in which there were multiple pre or post measurements, but no concurrent comparison group; and studies classified as having the least-suitable designs were those in which there was no comparison group and only a single pre and post measurement in the intervention group. Studies without a control population (i.e., with either no treatment or a different form of treatment) were excluded from consideration because the untreated response to traumatic exposures is variable and may change rapidly over time; thus, without a control, effect or lack of effect cannot be validly attributed to an intervention. The current effort's classifications of study designs sometimes differ from the classification or nomenclature used in the original studies.

Study execution was penalized for limitations in population and intervention description, sampling, exposure or outcome measurement, analytic approach, control of confounding, completeness and length of follow-up, and other biases.<sup>16</sup> On the basis of the number of penalties, the execution of studies was characterized as good (i.e.,  $\leq 1$  penalty); fair (i.e., 2–4 penalties); or limited (i.e.,  $> 4$  penalties) for purposes of this review.<sup>16,17</sup> Studies with  $> 4$  penalties were excluded.

The strength of the evidence was summarized on the basis of the number of available studies, the quality of their designs and execution, and the size and consistency of reported effects, as described in detail elsewhere.<sup>16</sup> In brief, by *Community Guide* standards, single studies of the greatest design suitability and good execution can provide sufficient evidence of effectiveness if the effect size is significant ( $p < 0.05$ ). Three studies of at least moderate design suitability and fair execution, or five studies with at least fair execution and any level of design suitability, can provide sufficient evidence of effectiveness if the findings are consistent in direction and size and if the effect size is itself considered sufficient (i.e., of public health importance). Greater numbers of studies or combinations of greater design suitability and execution, along with consistency and adequacy of effect sizes, may lead to a conclusion of strong evidence of effectiveness. The studies included in this review are summarized in the Appendix.

### Summarizing the Body of Evidence on Effectiveness

The body of evidence was systematically assessed as a whole, using *Community Guide* methods.<sup>16</sup> When data were available (means, sample size, and variance estimate), Hedges' adjusted  $g$  was used to estimate intervention effects. This statistic expresses relative changes in the intervention and comparison groups in standard deviations (SDs) (i.e., as standardized mean differences [SMDs]).<sup>23</sup> In studies for which Hedges' adjusted  $g$  could not be calculated, study results were represented as a point estimate of the relative change in the outcome of interest associated with the intervention, compared to the control.

In meta-analyses, weighted summary effect sizes, 95% confidence intervals (CIs), and  $p$ -values were obtained for both fixed-effects and random-effects models. When data were available, results were stratified by index trauma, that is, the trauma thought to have caused the symptoms for which the child or adolescent is being treated. The homogeneity of effect sizes was assessed with the  $Q$  statistic,<sup>24</sup> and quantified with the  $I^2$  statistic.<sup>25</sup>

The  $Q$  statistic tests whether the studies have a common population-effect size, or if the variability among studies is greater than would be expected by chance.<sup>23,24</sup> Conclusions were kept conservative through the use of 0.10 as the criterion  $p$ -value for significance; therefore, a  $p$ -value  $< 0.10$  indicated heterogeneity.<sup>23,24</sup> The  $I^2$  statistic estimates the percentage of variability of effect estimates due to sources of heterogeneity other than sampling error. Values  $> 50\%$  are considered to reflect substantial heterogeneity.<sup>25</sup>

Studies published in languages other than English and unpublished studies were not included in this review. To determine whether these sources might plausibly overturn the study's findings, the "file drawer" or "fail-safe" number was calculated<sup>26</sup>—an estimate of the number of unutilized studies indicating no effect that it would take to undermine this effort's conclusion. These estimates were made only when sufficient evidence was found to support an intervention.

### Summarizing Applicability, Other Effects, Barriers to Implementation, Economic Efficiency, and Research Gaps

If an intervention is found to be effective, *Community Guide* reviews assess its applicability in diverse settings, populations, and circumstances, as well as summarizing barriers to implementation and evaluating economic efficiency.<sup>27,28</sup> This review did not systematically assess the effects of the intervention on outcomes other than psychological harm (e.g., school achievement or other behavior problems). However, the benefits or harms identified by authors of the studies or by the systematic review team are mentioned.

## Results

### Cognitive–Behavioral Therapy

**Background.** Cognitive–behavioral therapy (CBT), shown to decrease PTSD symptoms in adults, has been adapted for children and adolescents exposed to trauma.<sup>19</sup> CBT usually combines exposure techniques (e.g., direct discussions of the traumatic event, imagery exposure by thinking or writing about the event); stress management or relaxation techniques;



and cognitive exploration, including the correction of inaccurate cognitions, the reframing of counterproductive cognitions regarding the trauma, and consideration of moving on beyond the trauma.<sup>29</sup> It is believed that associations between a traumatic event and intense reactions or feelings (e.g., fear, horror, helplessness, dread, panic), which are triggered by nontraumatic stimuli (reminders), can be replaced by more realistic associations (e.g., a low-flying plane does not necessarily mean there will be another plane crash or terror attack) by gradually challenging or confronting the inaccurate and counterproductive cognitions.<sup>19</sup> Several CBT interventions use play or role-play to facilitate expression among patients.

Cognitive behavioral therapy has been used for child victims of diverse index traumatic exposures: sexual abuse, physical abuse, domestic violence, natural disasters, community violence, and life-threatening illnesses.<sup>30</sup> CBT for children or adolescents may be accompanied by therapy sessions for or with their parents. CBT is often administered by doctoral-level professionals or other clinicians with graduate degrees, such as social workers, generally in 8–12 sessions. CBT can be delivered individually or to groups; this review analyzed individual and group CBT interventions separately. In the CBT studies reviewed, children as young as age 2 years were included<sup>31,32</sup> with the mean ages in studies (where reported) ranging from 4.7 years to 22 years. Many CBT interventions reviewed use manuals for implementation, and many studies assess fidelity as part of their evaluation.

Eye movement desensitization and reprocessing (EMDR) is often considered a form of CBT, because it includes exposure and cognitive restructuring.<sup>33</sup> In EMDR, patients are asked to recall the traumatic event while following the back-and-forth hand movements of the therapist with their eyes.<sup>34</sup> Studies of EMDR are included in the present review of CBT.

**Effectiveness: individual CBT.** Eleven studies<sup>31,35–44</sup> evaluating individual cognitive behavioral therapy met the inclusion criteria. All were of greatest design suitability; seven<sup>31,36,38–41,43</sup> were of good quality of execution, and four<sup>35,37,42,44</sup> were of fair quality. No studies were excluded because they had >4 penalties. One study<sup>42</sup> reported a mean age of 22 and an age range of 18–37 years; because the study population was reported to be students, it was posited that one study subject aged 37 years was an outlier and that the median age was likely to be ≤21 years.

The number of CBT sessions ranged from 2 (for the EMDR form of CBT) to 20 (median=12). The most common index traumas were sexual abuse and physical abuse. These studies assessed the effects of individual CBT on traumatized children and adolescents of varying ages, geographic locations, index traumatic exposures, and time since trauma exposure. Children who

were too disruptive or were seriously suicidal were commonly excluded from participating in these studies. Five studies<sup>31,36–38,41</sup> included parental involvement in a portion of treatment sessions.

The summary effect measures for the 11 studies were in the desired direction for all outcomes (i.e., the intervention group had a higher reduction in the rate of psychological harm than the comparison group), and ranged from random-effects SMDs of –0.06 to –0.34 (Table 1). Although summary effects were of similar magnitude for all of the outcomes assessed, those for PTSD and anxiety were significant, whereas those for internalizing behavior, externalizing behavior, and depression were not (primarily due to differences in the number of studies reporting each outcome). Results for PTSD are shown in Figure 2. The assessment of the results by type of traumatic exposure indicated that the effects of individual CBT may be larger for people who reported types of trauma other than sexual abuse. (Data were reported such that types of trauma other than sexual abuse could not be stratified.) Stratified analyses also revealed that CBT effects were greatest when comparison groups were untreated (i.e., receiving no treatment or on a treatment waiting list) rather than receiving alternate forms of treatment. The fail-safe N was 3 studies, that is, it would take 3 studies with null findings to make invalid the reported finding of a beneficial effect.

**Applicability, other effects, and barriers to implementation.** The studies reviewed assessed the effects of individual CBT on traumatized children and adolescents of varying ages, geographic locations, and traumatic exposures. Studies were conducted predominantly on white and black youth and were conducted in the U.S., except for one conducted in Australia<sup>40</sup> and another in The Netherlands.<sup>42</sup> Target populations in most studies had experienced sexual abuse or physical abuse; three studies did not specify the trauma or included participants with a variety of exposures. CBT appeared to be effective for varied index traumas, despite the small number of such studies and associated statistical power. Studies excluded children who were too disruptive or seriously suicidal. As a result, the applicability to more-disruptive children or those at risk of suicide is unknown.

The benefits of individual CBT reported in the literature were decreased shame, improved trust,<sup>38</sup> and enhanced emotional strength and parenting ability of the caretaking parent.<sup>38</sup> The effects of CBT on participating parents may be a mediator of effects on children. No potential harms of individual CBT were noted. Standardized individual CBT requires relatively intensive efforts by providers. Specific training is necessary for those delivering this type of therapy.

**Conclusion: individual CBT.** According to *Community Guide* rules,<sup>16</sup> these results provide strong evidence that

**Table 1.** Effectiveness of individual cognitive-behavioral therapy, stratified by outcome, type of comparison, and index trauma

	No. studies	Fixed-effects SMD <sup>a</sup>	Fixed-effects CI	Random-effects SMD <sup>a</sup>	Random-effects CI	Q statistic <sup>b</sup>	I <sup>2</sup> (%) <sup>c</sup>
<b>TOTAL PAPERS</b>	11						
<b>Outcome</b>							
Anxiety	7	-0.31	-0.51, -0.10	-0.31	-0.51, -0.10	4.10	0
Depression	8	-0.11	-0.31, 0.10	-0.19	-0.51, 0.13	13.56 <sup>d</sup>	48.39
Externalizing behavior	7	-0.06	-0.28, 0.15	-0.23	-0.65, 0.19	19.30 <sup>d</sup>	68.91 <sup>c</sup>
Internalizing behavior	4	-0.13	-0.48, 0.22	-0.13	-0.71, 0.45	7.97 <sup>d</sup>	62.37 <sup>c</sup>
PTSD symptomatology	6	-0.34	-0.63, -0.04	-0.34	-0.63, -0.04	5.08	1.51
<b>Type of comparison</b>							
<b>Treated comparison</b>							
Anxiety	5	-0.26	-0.48, -0.04	-0.26	-0.48, -0.04	2.18	0
Depression	6	-0.01	-0.23, 0.21	-0.01	-0.23, 0.21	3.22	0
Externalizing behavior	6	-0.03	-0.25, 0.19	-0.19	-0.64, 0.27	17.86 <sup>d</sup>	72.00 <sup>c</sup>
Internalizing behavior	3	-0.05	-0.43, 0.33	-0.01	-0.72, 0.70	6.86 <sup>d</sup>	70.83
PTSD symptomatology	5	-0.25	-0.56, 0.07	-0.25	-0.56, 0.07	2.88	0
<b>Untreated comparison</b>							
Anxiety	2	-0.70	-1.32, -0.08	-0.70	-1.32, -0.08	0.17	0
Depression	2	-0.87	-1.48, -0.25	-0.83	-2.01, 0.35	3.67	72.72
Externalizing behavior	1 <sup>f</sup>	-0.61	-1.52, 0.31	NA	NA	NA	NA
Internalizing behavior	1 <sup>f</sup>	-0.58	-1.48, 0.33	NA	NA	NA	NA
PTSD symptomatology	1 <sup>f</sup>	-0.86	-1.79, 0.06	NA	NA	NA	NA
<b>Index trauma</b>							
<b>Sexual abuse</b>							
Anxiety	4	-0.23	-0.48, 0.01	-0.23	-0.48, 0.01	1.59	0
Depression	4	-0.03	-0.28, 0.21	-0.03	-0.28, 0.21	1.74	0
PTSD	4	-0.29	-0.65, 0.06	-0.29	-0.69, 0.11	3.69	18.71
<b>Varied</b>							
Anxiety	3	-0.48	-0.86, -0.11	-0.48	-0.88, -0.08	2.19	8.84
Depression	3	-0.41	-0.85, 0.03	-0.48	-1.43, 0.47	9.29 <sup>d</sup>	78.48
PTSD	2	-0.36	-0.91, 0.19	-0.34	-0.79, 0.11	0.68	0

<sup>a</sup>Standardized mean difference (Hedge's adjusted g)

<sup>b</sup>Test for homogeneity of results

<sup>c</sup>Describes percentage of variability due to heterogeneity other than sampling error

<sup>d</sup>Q-statistic is significant at  $\alpha=90$ ; therefore, the random-effects model is preferred.

<sup>e</sup>Values >50% are considered substantial heterogeneity.

<sup>f</sup>The fixed effects SMDs and CIs are based on a single study.

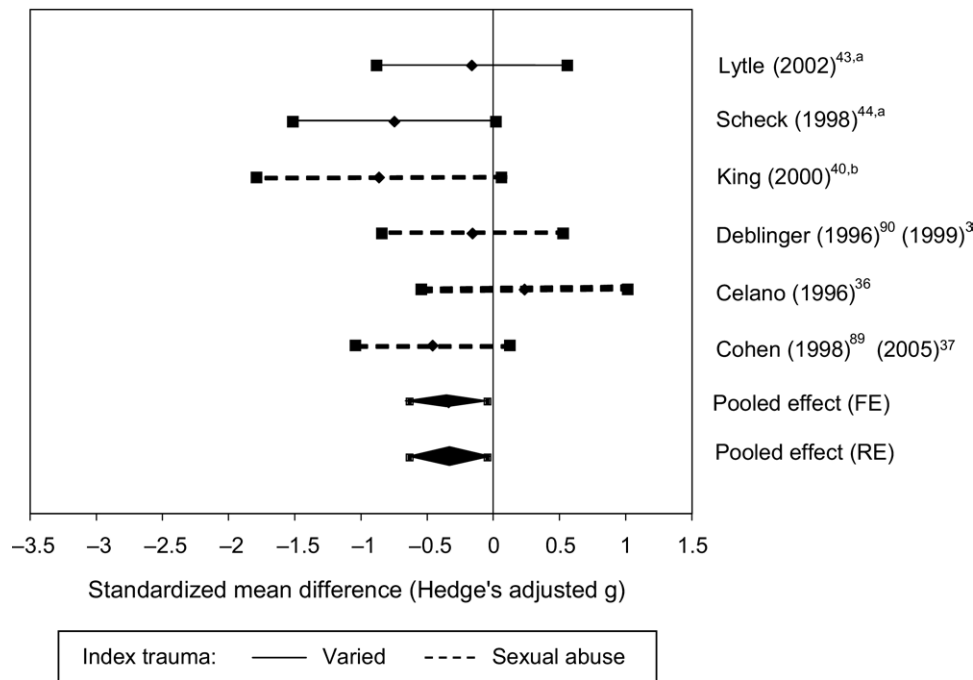
NA, not applicable; No., number; PTSD, posttraumatic stress disorder; SMD, standardized mean difference

individual CBT among children and adolescents who have developed symptoms following traumatic exposures is associated with decreases in overall psychological harm (e.g., anxiety, PTSD, depression, and externalizing and internalizing symptoms).

**Effectiveness: group CBT.** Ten studies<sup>32,45-54</sup> were identified (one study reported in two papers<sup>49,50</sup>) that evaluated group CBT and met the inclusion criteria. All studies were of greatest design suitability; three<sup>32,46,53</sup> were of good execution and seven<sup>45,47-52,54</sup> were of fair execution. No studies were excluded because they had >4 penalties. The number of sessions ranged from 1 to 10 (median=8). Three studies<sup>32,48,53</sup> included parental involvement in a portion of treatment sessions.

Summary-effect measures for the ten studies were in the desired direction for all outcomes assessed—*anxiety, depression, and PTSD* (Table 2; Figure 3 shows results for PTSD only). Random-effects SMDs ranged from -0.37 to -0.56. CIs did not include zero for depression and PTSD, but did for anxiety. As with individual CBT, the estimated effects for group CBT were greatest

in comparison with untreated control groups. Index trauma varied and included community violence and war,<sup>45,47,51,45,47,48,51,52,54</sup> as well as volcanic eruptions,<sup>52</sup> sexual abuse,<sup>32,46</sup> suicide of a family member,<sup>48</sup> and juvenile cancer and treatment.<sup>53</sup> Stratified analyses on depression and PTSD outcomes by type of index trauma indicate substantial and significant effects for groups with index traumas of community violence but not for natural disasters. For those whose index trauma was sexual abuse or suicide of a family member, effect estimates tended to be smaller, but each of these estimates was based on single data-points. One study<sup>46</sup> provided five repeated measures of anxiety, depression, and externalizing behaviors over a 2-year period—the only study with a series of repeated measures. In this study, the benefits were not evident until a year or more after the conclusion of the intervention and did not decrease over time. As is usual in group therapy, some studies excluded children who were too disruptive (per mental health clinician) or had severe mental health problems (e.g., psychotic disorders, severe develop-



**Figure 2.** Changes in PTSD symptoms attributable to individual CBT. Horizontal lines and large diamonds represent 95% CI.

<sup>a</sup>Eye movement desensitization and reprocessing (EMDR)

<sup>b</sup>Untreated control group

mental delays, or behaviors that were dangerous to themselves or others). The fail-safe N was 2 studies, that is, it would take 2 studies with null findings to make invalid the reported finding of a beneficial effect.

**Applicability, other effects, and barriers.** The studies reviewed assessed the effects of group CBT on traumatized children and adolescents of varying ages, geographic locations, and traumatic exposures. Most children in these studies were exposed to multiple traumas, and group CBT effectively reduced psychological harm among these children. Because of the small number of studies, it was difficult to determine whether the effectiveness of group CBT varied by index trauma. As is usual in group therapy, some studies excluded children who were too disruptive (per mental health clinician) or had severe mental health problems (e.g., psychotic disorders, severe developmental delays, or behaviors that were dangerous to themselves or others). Parents were participants in many of the programs included in this review; some studies indicated psychological benefits to the parents themselves, and parental participation may be a mediator of effects on children.

Other benefits of group CBT included preventing academic decline<sup>50</sup> and improving parent-child relationships.<sup>32,46</sup> Vicarious traumatization (i.e., traumatization by exposure to reports of the traumatic events experienced by others and shared in the group setting) has been cited as a potential harm of group CBT,<sup>19</sup> but no reviewed study assessed or reported evidence of

such an occurrence. This potential harm may be avoided by having group CBT participants recount their traumatic experiences with a therapist outside of the group setting.

Standardized group CBT requires relatively intensive efforts by providers. Specific training is necessary on the part of those delivering this type of therapy. Making it possible for a group of children to attend each session may pose scheduling challenges. The administration of group CBT in schools provides one potential solution to this challenge.<sup>55</sup>

### Conclusion: group CBT.

According to *Community Guide* rules,<sup>16</sup> these results provide strong evidence that group CBT among

children and adolescents who have developed symptoms following traumatic exposures is associated with decreases in psychological harm (i.e., anxiety, depression, and PTSD).

**Economic efficiency: individual and group CBT.** No studies were identified that specifically examined the cost effectiveness or cost benefit of CBT in reducing psychological harm among children and adolescents exposed to traumatic events. However, two studies were identified<sup>56,57</sup> that analyzed the cost effectiveness of CBT for children and adolescents with depression (not necessarily related to a traumatic exposure). Because of the strong association between depressive disorders and PTSD, the estimates from these studies may be useful indicators of the potential economic efficiency of trauma-focused CBT.<sup>58</sup> The evidence from these studies suggests that CBT has the potential for being cost effective by commonly used threshold values for cost effectiveness. However, more direct evidence is required on the economic benefits of CBT in reducing psychological harm resulting from traumatic events among children and adolescents.

### Play Therapy

**Background.** It is believed that play links a child's internal thoughts to the outer world by allowing the child to control or manipulate outer objects.<sup>59</sup> Play connects concrete experience and abstract thought

**Table 2.** Meta-analysis results for group cognitive-behavioral therapy stratified by outcome, type of comparison, and index trauma

	No. studies	Fixed-effects SMD <sup>a</sup>	Fixed-effects CI	Random-effects SMD <sup>a</sup>	Random-effects CI	Q statistic <sup>b</sup>	I <sup>2</sup> c (%)
<b>TOTAL PAPERS</b>	10						
<b>Outcome</b>							
Anxiety	4	-0.29	-0.60, 0.02	-0.37	-0.96, 0.10	7.62 <sup>d</sup>	60.62 <sup>c</sup>
Depression	7	-0.41	-0.61, -0.21	-0.40	-0.58, -0.23	5.31	0
PTSD symptomatology	8	-0.56	-0.73, -0.38	-0.56	-0.92, -0.19	26.81 <sup>d</sup>	73.89 <sup>c</sup>
<b>Type of comparison</b>							
<b>Treated comparison</b>							
Anxiety	2	-0.10	-0.45, 0.25	-0.10	-0.54, 0.34	1.59	37.18
Depression	1	-0.14	-0.69, 0.41	NA	NA	NA	NA
PTSD symptomatology	2	0.07	-0.30, 0.44	0.07 <sup>f</sup>	-0.30, 0.44	0.02	0
<b>Untreated comparison</b>							
Anxiety	2	-1.00	-1.66, -0.33	-0.88	-1.69, -0.08	2.77 <sup>d</sup>	63.85 <sup>c</sup>
Depression	6	-0.53	-0.72, -0.33	-0.56	-0.81, -0.31	7.22	30.76
PTSD symptomatology	6	-0.74	-0.94, -0.54	-0.93	-1.30, -0.57	33.04 <sup>d</sup>	84.87 <sup>c</sup>
<b>Index trauma</b>							
<b>Community violence</b>							
Depression	4	-0.46	-0.69, -0.24	-0.49	-0.79, -0.19	4.51	33.47
PTSD	4	-0.73	-0.96, -0.51	-0.87	-1.35, -0.39	13.74 <sup>d</sup>	78.18 <sup>c</sup>
<b>Natural disasters</b>							
Depression	2 <sup>f</sup>	-1.08	-1.60, -0.57	-1.11	-1.75, -0.48	1.44	30.33
PTSD	2	-0.44	-0.79, -0.09	-1.01	-1.51, -0.51	21.53 <sup>d</sup>	95.36 <sup>c</sup>
<b>Sexual abuse</b>							
Depression	1	-0.14	-0.69, 0.41	NA	NA	NA	NA
PTSD	1	0.04	-0.55, 0.63	NA	NA	NA	NA
<b>Suicide of family member</b>							
Depression	1	-0.38	-1.20, 0.43	NA	NA	NA	NA
PTSD	1	-0.10	-0.88, 0.68	NA	NA	NA	NA

<sup>a</sup>Standardized mean difference (Hedge's adjusted g)

<sup>b</sup>Test for homogeneity of results

<sup>c</sup>Describes percentage of variability due to heterogeneity other than sampling error

<sup>d</sup>Q-statistic is significant at  $\alpha=0.90$ ; therefore, the random-effects model is preferred.

<sup>e</sup>Values >50% are considered substantial heterogeneity.

<sup>f</sup>Goenjian<sup>50</sup> stratified analysis by gender (this adds one to the total number of studies).

NA, not available; PTSD, posttraumatic stress disorder; SMD, standardized mean difference

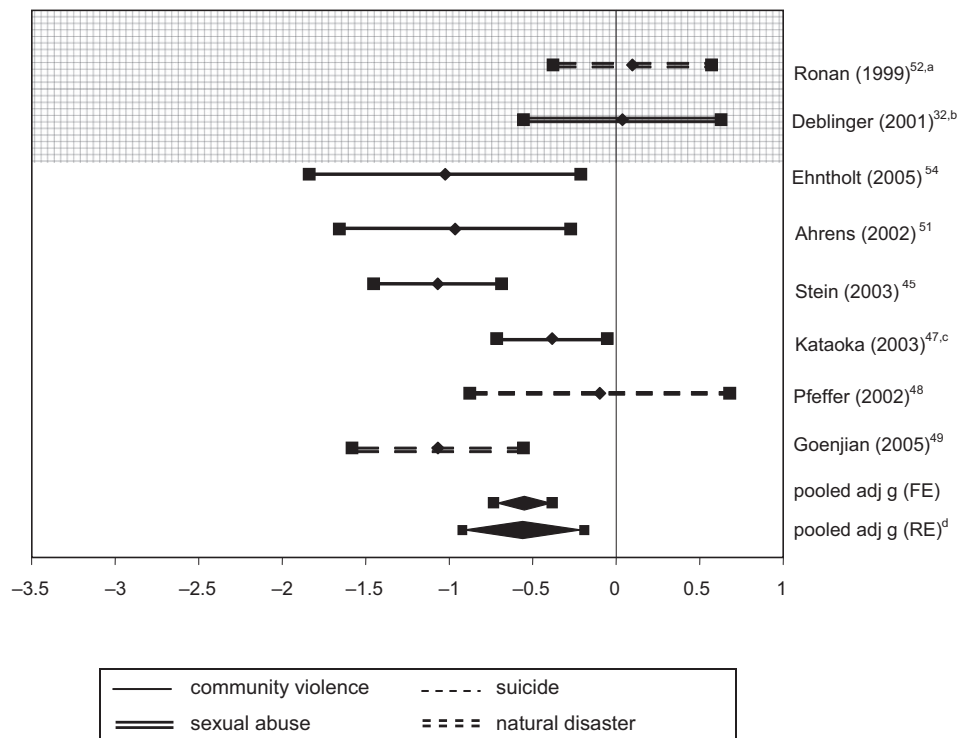
while allowing the child to safely express experiences, thoughts, feelings, and desires that might be more threatening if directly addressed.<sup>60</sup> Play may be incorporated in many types of psychotherapy, such as CBT, to facilitate communication.<sup>30</sup> However, for the purposes of this review, play therapy was defined as *an approach that uses play as the principal means for facilitating the expression, understanding, and control of experiences, and not simply a way of facilitating communication*. A recent meta-analysis found that play therapy for an array of presenting problems far broader than exposure to traumatic events had desirable results on several outcome measures, including anxiety and internalizing and externalizing behaviors.<sup>61</sup> In the studies reviewed here, children in play therapy were aged 4–12 years, with study mean ages (where reported) between 6.2 and 6.9 years. None of the studies reviewed noted the use of a manual or reported assessment of fidelity.

**Effectiveness: play therapy.** Four studies<sup>60,62–64</sup> were identified that examined the effectiveness of play therapy in reducing psychological harm to children exposed to traumatic events. Three<sup>60,63,64</sup> of the four

shared a nonconcurrent comparison group and were conducted by a common group of researchers. Therefore, this was considered to be one study with three arms. Thus, the body of evidence for this review consisted of two studies of greatest design suitability and fair execution. There was substantial heterogeneity among the studies reviewed in terms of index exposure and play-therapy implementation. One study<sup>62</sup> assessed the effectiveness of a program for children exposed to an earthquake in Taiwan; the other study<sup>60,63,64</sup> assessed a program for children exposed to (presumably chronic) domestic violence who were living in women's and homeless shelters. One study arm<sup>60,63,64</sup> was delivered at the individual level, one to children and a parent,<sup>60,63,64</sup> one to siblings,<sup>60,63,64</sup> and one to a group of students.<sup>62</sup>

All of the effect sizes reported were in the desirable direction, with SMDs ranging from -0.06 to -1.23 across all of the studies and outcomes. For one study<sup>60,63,64</sup> consisting of a two-week program with children and their parents, the three study arms showed a pooled reduction in aggression of -0.81 fixed-effect SMD (95%CI=-1.34, -0.26). One study<sup>62</sup>





**Figure 3.** Changes in PTSD symptoms attributable to group CBT. Horizontal lines and large diamonds represent 95% CIs. Shaded area indicates control group received some form of treatment

<sup>a</sup>Control: exposure therapy

<sup>b</sup>Control: supportive therapy

<sup>c</sup>Preferred estimate (homogeneity assumption rejected)

<sup>d</sup>Nonrandomized trial

showed a reduction in suicidal behavior of  $-1.05$  SMD (95%CI =  $-1.83, -0.26$ ).

**Conclusion: play therapy.** Although the findings indicate benefit, the substantial variability among the interventions evaluated and the fact that most outcomes of interest were evaluated only in one study does not allow for a clear conclusion. Thus, there is insufficient evidence to determine the effectiveness of play therapy in reducing psychological harm among children who have developed symptoms of PTSD following traumatic exposures. Because studies of play therapy, in contrast to studies of the other interventions reviewed, did not exclude suicidal (and perhaps more severely affected) children, it may have been more difficult to show a benefit of this intervention.

### Art Therapy

**Background.** Proponents of art therapy argue that trauma is stored in memory as an image; therefore, expressive art techniques are an effective method for processing and resolving it.<sup>65</sup> It has been proposed that drawing, like play, allows for visual and other perceptual experiences of the traumatic event to become represented and transformed by a child's activity.<sup>59</sup> Case series studies have concluded that imagery-specific techniques, including art therapy, are effective in re-

ducing PTSD symptomatology in adolescents.<sup>65</sup> Patient-created images are sometimes used in CBT to facilitate the recall of the traumatic event. For the purposes of this review, art therapy was considered to be not simply a way of facilitating communication but a principal means for expressing, understanding, and controlling experiences.

**Effectiveness: art therapy.** One study<sup>66</sup> was identified that examined the effect of art therapy on psychological harm. The study included symptomatic children who were hospitalized for a minimum of 24 hours after a physical trauma. The intervention was a 1-hour art therapy session, in which art was used to retell the trauma. The study did not note the use of a manual or report assessment of fidelity. Compared with the control group, who received standard hospital services that did not include psychotherapy, the intervention group demonstrated a relative reduction in PTSD symptoms of 21%, but this finding was not significant.

**Conclusion: art therapy.** According to *Community Guide* rules,<sup>16</sup> the evidence from this single study is insufficient to determine the effectiveness of art therapy in preventing or reducing psychological harm among children and adolescents who have developed symptoms of PTSD following traumatic exposures.

## Psychodynamic Therapy

**Background.** The goal of psychodynamic therapy is to allow the traumatized individual to release unconscious thoughts and emotions and to integrate the traumatic event into his or her understanding of life and self-concept.<sup>67</sup> Consisting largely of nondirective and interpretive sessions, this therapy usually lasts many months.<sup>30</sup> Psychodynamic therapy may be provided by specially trained psychoanalysts or by other professionals who incorporate psychodynamic practices.

**Effectiveness: psychodynamic therapy.** Two studies<sup>68,69</sup> that evaluated the use of psychodynamic therapy were identified. One of these<sup>69</sup> examined the relative efficacy of individual psychotherapy compared with group psychoeducation in the treatment of symptomatic, sexually abused girls. Because discrepancies between the results presented in text and tables could not be resolved, this study could not be included in the review.

The remaining study,<sup>68</sup> of greatest design suitability and fair execution, used psychodynamically based child–parent psychotherapy weekly for 50 weeks for children aged 3–5 years who had been exposed to violence between their parents. Control subjects received case management plus individual psychotherapy; they were phoned at least monthly to check on their well-being, and they were referred for psychotherapy when it was indicated. Following the treatments, compared to case management, child–parent psychotherapy was associated with an SMD of  $-0.87$  (95%CI =  $-1.37, -0.37$ ) in PTSD symptoms among children in the study. The intervention used a manual for implementation and assessed fidelity as part of its evaluation.

**Conclusion: psychodynamic therapy.** Based on the single included study, there is insufficient evidence to determine the effectiveness of psychodynamic therapy in preventing or reducing psychological harm among children and adolescents who have developed symptoms of PTSD following traumatic exposures.

## Pharmacologic Therapy

**Background.** Drug therapies for PTSD are thought to address neurochemical disruptions in mechanisms controlling arousal, fear, memory, and other aspects of emotional processing that are implicated in the development and maintenance of PTSD.<sup>70</sup> The intent of pharmacologic therapy is to relieve disabling symptoms so that the traumatized child or adolescent is able to pursue a normal developmental pattern, and to increase tolerance to emotionally distressing material and work through such distress.<sup>71</sup> A survey indicates that many medical practitioners treating children and adolescents with symptoms of PTSD believe that medications are the most effective treatment for specified

symptoms—41.6% support the use of medicines for re-experiencing trauma, 20.8% for avoidance/numbing, and 76.7% for hyperarousal.<sup>2</sup> Psychotropic medications, such as antidepressants and anti-anxiety medications, are typically prescribed for child or adolescent trauma victims who have symptoms such as panic attacks, depression, PTSD, anxiety disorders, and behavioral disorders.<sup>30</sup> However, medications for these treatments in children and adolescents have received little empirical investigation.<sup>30,71</sup> The U.S. Food and Drug Administration has recommended caution in the use of antidepressants for people aged 18–24 years because of indications of suicidal thoughts associated with initial treatment with some medications.<sup>72</sup>

**Effectiveness: pharmacologic therapy.** Two studies<sup>73,74</sup> were found of children and adolescents treated with medications following traumatic events. One study<sup>73</sup> was of greatest design suitability and fair execution. Children and adolescents aged 2–19 years who had suffered substantial burns and manifested symptoms of acute stress disorder were given either imipramine or choral hydrate (the control). They were assessed for symptoms of acute stress disorder prior to 1 week of drug administration and at three points during treatment. Patients given imipramine were 1.2 times more likely ( $p=0.04$ ) to show a reduction in symptoms than patients given the control treatment. However, postdrug and longer-term outcomes were not assessed.

A second study,<sup>74</sup> of moderate design suitability and fair execution quality, examined the effect of pharmacotherapy on children with a PTSD diagnosis. The beta-adrenergic antagonist, propranolol, was administered for 4 weeks. Subjects showed an SMD of  $-1.37$  (95%CI =  $-2.30, -0.44$ ) improvement in PTSD symptoms during treatment, followed by a return to baseline-symptom levels after treatment ended, indicating symptomatic relief while on the medication. An additional study<sup>75</sup> assessed the effectiveness of adding the drug sertraline to CBT (compared with CBT and placebo) in reducing psychological harm among girls and adolescents aged 10–17 years who had been sexually abused. This study was not included in the body of evidence on drug effectiveness because, while informative, its design allowed only the testing of CBT plus a medication rather than of the medication itself. Sertraline was found not to confer significant benefit (beyond CBT) on the outcome measures assessed in this review.

**Conclusion: pharmacologic therapy.** There is insufficient evidence to determine the effectiveness of pharmacologic interventions for preventing or reducing psychological harm among children and adolescents who have developed symptoms of PTSD following traumatic exposures. Evidence is insufficient both because the number of studies is small and the outcome assessed (i.e., symptomatic relief shown only during the

course of treatment) is not of enduring public health significance.

## Psychological Debriefing

**Background.** Psychological debriefing, a group meeting generally arranged 24–72 hours after a traumatic event, is intended to mitigate psychological harms associated with the trauma. As described by practitioners in a manual subtitled “An operations manual for the prevention of traumatic stress among emergency services and disaster workers,” psychological debriefing consists of stages.<sup>76</sup> These include discussion of the traumatic event and the group members’ reactions, normalization of those reactions, and education in steps useful in controlling those reactions.<sup>76</sup> Because the purpose is to aid recovery, not to treat symptoms, participants in psychological debriefing are not screened for symptoms.<sup>76</sup> Reviews of psychological debriefing for adults yielded mixed evidence. One meta-analysis<sup>77</sup> found that psychological debriefing was beneficial for diverse subjects suffering diverse trauma. However, a narrative review<sup>78</sup> found that psychological debriefing did not prevent psychiatric disorders or mitigate the effects of stress, and a Cochrane review<sup>79</sup> found no short-term benefit and evidence of harm at long-term follow-up.

**Effectiveness: psychological debriefing.** One study,<sup>80</sup> identified as psychological debriefing, was of greatest design suitability and good quality of execution. The study was a randomized trial of the treatment of children and adolescents (aged 7–18 years) following a traffic crash. Approximately 4 weeks after the crash—an unusually long delay compared with usual practice—psychological debriefing was administered to the intervention group, and the comparison group received a non-crash talk treatment (in which the topic of the crash was not supposed to be addressed). The study did not note use of a manual or report assessment of fidelity. The findings for three outcomes (depression, anxiety, and PTSD) were in the undesirable direction (ranging from a 3% relative increase in depression among the intervention group compared to the control group to an 11% relative increase in PTSD symptoms); none of these effects were significant.

**Other harms and benefits: psychological debriefing.** Participants in both the debriefing and the control groups reported satisfaction with their experiences, despite a lack of improvement in symptoms. Similar results have been reported in other studies (of adults).<sup>79</sup> Systematic reviews of psychological debriefing in adults also indicate a potential harm of secondary traumatization, in which participants revisit their trauma without being provided an effective means of resolving the experience.<sup>15</sup> Aulagnier et al.<sup>81</sup> also note that psychological debriefing may result in the delayed diagnosis of psychological problems associated with the traumatic ex-

posure. Cohen et al.<sup>82</sup> note the possibility of vicarious traumatization.

**Conclusion: psychological debriefing.** Based on a single qualifying study that provided no evidence of beneficial effects, the evidence was insufficient to determine the effectiveness of psychological debriefing in preventing or reducing psychological harm among children and adolescents who have been exposed to trauma. Although this study was identified as psychological debriefing, the administration of the intervention several weeks after the traumatic exposure clearly differentiates it from the usual practice of psychological debriefing. The potential harms identified in research on adults suggest caution in the use of, and research on, this intervention among children and adolescents.

## Research Issues for All Seven Reviewed Interventions

Although strong evidence was found of the effectiveness of individual and group CBT, important research issues remain for these two therapies.

- The identification of robust predictors of transient and enduring symptoms following traumatic events would allow for better screening of exposed children and adolescents and more efficient allocation of treatment resources.
- The optimal timing of CBT intervention following the exposure and the onset of symptoms is important to assess.
- It would be useful to stratify the outcomes of CBT treatment by the severity of patient PTSD symptoms and history. For example, it would be useful to know whether children and adolescents with multiple traumatic exposures require more intensive or longer treatment.
- One study<sup>46</sup> with long-term follow-up indicates that it may take 1 year after the end of the intervention for benefits to appear. This result should be replicated. If confirmed, it suggests that follow-up periods of less than 1 year are not adequate and may erroneously indicate intervention ineffectiveness.
- The cost effectiveness and differential cost effectiveness of individual and group CBT among children and adolescents should be explored.
- The effectiveness of individual and group CBT among minority populations, especially in communities in which violence is prevalent, should be further explored.
- Adaptations of CBT involving the recruitment, training, deployment, and supervision of nonprofessionals should be evaluated, and their applicability to low-income countries should also be explored.

Further, the finding of insufficient evidence to determine the effectiveness of several of the interventions reviewed highlights the need for additional well-

controlled studies of these interventions. Because CBT has been found to be an effective intervention, and because research funds are limited, it would be useful to adopt CBT as a comparison in future evaluations. Because of harms reported for psychological debriefing among adults, caution should be taken in research on this intervention with children and adolescents.

## Discussion

The classification and comparison of interventions reported in studies is challenging and often imperfect. Moreover, information is not reported or not consistently reported, and it is often difficult to determine whether what is described as the program is what was intended or what was actually implemented. Classification and comparison rest on numerous assumptions and judgments about what was sufficiently “the same” and “different,” not only for the interventions themselves but also for the settings in which they were carried out, the outcomes assessed, and the methods of study. A transparent approach was attempted for this study, and the authors believe that their groupings and comparisons are reasonable. In addition, a series of research questions are proposed that would strengthen practice and expand the options available to practitioners.

Exposure to traumatic events is a common experience of children and adolescents in the U.S. Although some children and adolescents appear to be unaffected or only briefly affected by such events, others suffer severe acute or long-term psychological and other health consequences. Thus, the need for interventions to prevent or reduce psychological harm among children and adolescents is critical.

Fortunately, strong evidence (according to *Community Guide* standards) indicates that CBT—administered in individual and group formats—is effective in reducing psychological harm among children and adolescents who have experienced trauma and who manifest symptoms. Given the heterogeneity of what is grouped together as the intervention, the trauma treated, and the circumstances of treatment, the existence of strong evidence suggests the robustness of the current study’s findings. Moreover, the evidence suggests that CBT is effective for reducing PTSD symptoms associated with various index traumas as well as with children who have experienced more than one form of trauma. Strong evidence of the effectiveness of individual and group CBT indicates that public and private organizations that provide assistance to traumatized people (e.g., social welfare agencies) should consider offering such treatments to their clients. These approaches should be widely taught to appropriate practitioners for response to diverse traumatic events.

In a survey of practice in the treatment of PTSD among children, the preferred response of approxi-

mately 20% of psychiatrists for treating symptomatic children and adolescents following traumatic exposures is pharmacological treatment,<sup>2</sup> for which insufficient evidence was found to determine effectiveness. The second, equivalently ranked treatments are psychodynamic approaches (for which insufficient evidence to determine effectiveness as also found) and CBT (strong evidence of effectiveness). Among non-medical clinician respondents (e.g., psychologists and counselors), the most preferred practice corresponded with the study’s findings (i.e., CBT); this was followed by family therapy and nondirective play therapy. The former was not evaluated, and insufficient evidence was found to determine the effectiveness of the latter. Crisis counseling—including psychological debriefing, for which insufficient evidence and the possibility of harm were found—was infrequently used by all types of clinicians surveyed.

Overall, it appears that more than three fourths of clinicians in the U.S. who treat children and adolescents with PTSD report, as their first line treatment, therapeutic approaches either that have not been systematically reviewed or for which effectiveness could not be determined by *Community Guide* standards.<sup>2</sup> A recent survey<sup>83</sup> of the training of clinicians providing psychological care (including psychiatrists, psychologists, and social workers) for adults as well as children also indicates an overall lack of focus on evidence-based therapeutic approaches. A focus on effective treatments such as individual and group CBT is critical for the training of practitioners who treat children and adolescents exposed to traumatic events.

Another major challenge is that children and adolescents who have been traumatized and may need treatment for PTSD or other psychological conditions generally do not receive that treatment. A recent study<sup>84</sup> used nationally representative data to examine the process by which juvenile crime victims receive (or fail to receive) mental health treatment. Surveyed juveniles had suffered a serious sexual or physical assault in the past year; although not all of these juveniles would have benefited from counseling, only 20% of them received professional counseling to deal with the traumatic experience. Many children and adolescents with mental health problems seek help not from mental health professionals but from school personnel or physicians.<sup>85</sup> It is not clear how these personnel deal with the problems presented. While the screening of children and adolescents for exposure to traumatic events and possible symptoms is not routine in pediatric or school settings, it has been recently recommended.<sup>82</sup>

The studies of CBT reviewed were conducted in high-income countries (as defined by the World Bank). Yet disasters and other traumatic events occur in low-income countries as well, notoriously the tsunamis of recent years and numerous inter-ethnic wars. A survey<sup>86</sup> of children exposed to the tsunami of December 2004



in Thailand indicates that PTSD symptoms were more than twice as frequent among those directly exposed to the event than among those in neighboring areas who were not directly exposed (but may, nevertheless, have been indirectly traumatized). A study<sup>87</sup> of former child soldiers in Uganda found that 97% had PTSD reactions of clinical importance. A study<sup>49,50</sup> of the use of a CBT-like group intervention for school children suffering in the aftermath of the 1988 earthquakes in Armenia indicates that this intervention was effective in reducing PTSD symptoms and depression; the researchers did not specify the therapists' disciplines, but reported them to be "highly skilled mental health professionals from the U.S." However, in many low-income–nation settings—because professional mental health care workers, who provide CBT in high-income nations, may be far less available and affordable—modified treatment approaches may be needed. Thus, it would be helpful to explore the use of trained paraprofessionals for the practice of CBT, or to identify other effective interventions that might be appropriate for these settings. Research to assess the feasibility and effectiveness of using non-mental health professionals trained in trauma-focused CBT to reduce psychological harm among children exposed to traumatic events in developing countries is currently underway in Zambia and Cambodia (L. Murray, Applied Mental Health Research Group, Boston University, personal communication, 2008).

The need is great for dissemination of effective treatment approaches for children and adolescents exposed to trauma. Such exposures are common in the U.S. and around the world. Psychological treatment for the resulting symptoms is rarely given, which can result in their exacerbation. When treatment is provided, it could be improved by a greater emphasis on the use of and training in evidence-based practices such as CBT. Effective means of treatment are at hand, and should be widely deployed and modified for use in underserved areas of need.

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## Appendix. Summary tables of studies included in the reviews

Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up		Assignment to treatment conditions Sample size (at pre/post assessments)		
Studies measuring effect of Group Cognitive Behavioral Therapy in children/adolescents							
Type of trauma: natural disaster							
Goenjian (1997, 2005) <sup>49,50</sup>	Gumri, Armenia	6 sessions over 6 week time frame	Pre-test assessments occurred	Control group received	Convenience	Child PTSD Reaction Index	-1.15
Greatest	Recruitment in 1990, 1.5 yrs after earthquake	Four sessions were within a group and lasted 1/2 hour.	1.5 yrs after earthquake, post test assessment occurred immediately after intervention and follow up occurred 3 yrs after earthquake	no treatment	Comparison with 2 other schools not participating in intervention	Ipre/post (boys): 41.6/30.4 Cpre/post (boys): 38.5/40.9	2.18
Fair	All participants in selected schools were evaluated for PTSD; all had residual symptoms of distress after earthquake	Other two sessions were individual and lasted 1-hour each			Ipre: n = 35 Cpre: n = 29 Ipost: n = 35 Cpost: n = 29	Ipre/post (girls): 47.1/33.1 Cpre/post (girls): 42.7/51.1 Depression Self-rating Scale Ipre/post (boys): 15.5/13.0 Cpre/post (boys): 12.7/17.7 Ipre/post (girls): 17.4/17.4 Cpre/post (girls): 16.4/21.3	0.86
	Mean age of adolescents: 13.2 yr; ethnicity: Armenian	Mental health professionals from U.S.					
Ronan (1999) <sup>52</sup>	New Zealand	1 session lasting 1 hour	Post-test occurred	Control group received	Convenience.	Reaction Index	0.10
Greatest	Recruitment in mid-1990s, 1 month after Mount Ruapehu erupted	Not specified who administered	immediately after intervention, along with a 4 month follow up	an exposure and normalizing condition. (one 1-hr session)	Random assignment at school level	(measures PTSD symptoms)	0.12
Fair	Our review focused only on the children who exhibited PTSD symptoms at pretest in this investigation				Ipre: n=38 Cpre: n = 31 Ipost: n=38 Cpost: n=31	Ipre/post: 14.6/11.9 Cpre/post: 17.6/13.4 Coping Questionnaire (anxiety measure) Ipre/post: 18.7/19.5 Cpre/post: 16.9/17.5	
	For entire sample: Mean age of children: 10.50 yrs (SD: 1.54). Race/ethnicity: 70 White (European descent) (63%), 12 Maori (11%), 6 Asian (5%), 21 Maori/European (19%), 2 Asian/Maori/Pacific Islander (2%), 1 Asian/Pacific Islander (0.9%)						
Type of trauma: suicide of family member							
Pfeffer (2002) <sup>48</sup>	New York City and Westchester County	Ten 1.5 hours group sessions weekly	Pre and post assessments occurred approximately	Control group received	Convenience	Revised Children's Manifest Anxiety Scale (RCMAS)	1.25
Greatest	1996-2000	Led by a trained	12 weeks apart	investigators, "could receive other interventions but participated in the research assessments"	Random assignment	Ipre/post: 49.3/39.6 Cpre/post: 52.6/56.5	0.38
Fair	Children bereaved by suicide of relative. Families and children identified from medical examiners' lists of consecutive suicide victims from January 1996 to November 1999	master's level psychologist			Ipre: n=39 Cpre: n=36 Ipost: n=32 Cpost: n=9	Ipre/post: 46.5/44.1 Cpre/post: 53.7/53.9 Children's Depression Inventory (CDI) Ipre/post: 46.5/44.1 Cpre/post: 53.7/53.9 Childhood Posttraumatic Stress Reaction Index (CPTSRI) Ipre/post: 25.1/19.6 Cpre/post: 22.1/17.8	0.10
	Age range: 6-15 yrs. Race/ethnicity: 84% White, 12% African American, 8% Hispanic						

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## Appendix. (continued)

Author & year	Location	Intervention		Other components (study arms, if any)	Sample selection	Assignment to treatment conditions	Effect measure calculated from study findings	Adjusted g
		Frequency and duration	Study period					
Berliner (1996) <sup>46</sup>	Unspecified "major metropolitan area"	8 sessions over 10 week period	Follow up occurred 2 years after intervention	Control group received standard care	Convenience	Revised Children's Manifest Anxiety Scale (RCMAS) inventory of anxiety symptoms	0.33	
Greatest					Random assignment	Ipre/ fu: 14.1/9.5	0.14	
Good	Sexually abused children referred by parents, child protective services, justice system, health and mental health providers	Led by clinical social workers			n baseline = 154 Ipost: n=29 Cpost: n=23	Cpre/ fu: 14.5/12.4 Children's Depression Inventory (CDI) Ipre/ fu: 9.7/6.7 Cpre/ fu: 10.1/8.0	0.11	
	Age range: 4–13 yrs Race/ethnicity: Treatment: 73% White, 8% African-American, 8% Hispanic, 10% Other; Control: 75% White, 16% African-American, 3% Hispanic, 6% Other					CBCL Externalizing Ipre/ fu: 18.2/13.5 Cpre/ fu: 15.0/11.6		
Deblinger (2001) <sup>32</sup>	New Jersey	11 weeks of therapy, 1.75 hrs each for parent's group and children's group sessions. Joint additional 15 minute session	Follow up occurred 3 months after group sessions ended	Control group received supportive therapy	Convenience	Kiddie Schedule for Affective Disorders and Schizophrenia for School Age Children-Epidemiologic version (K-SADS-E)	0.04	
Greatest	Sexually abused children and their non-offending mothers who were referred to the Regional Child Abuse Diagnostic and Treatment Center	Therapists received training and supervision in both group formats; compliance with adhering to each treatment modality was monitored			Randomized at group level n baseline = 54 Ipost: n=21 Cpost: n=23	Ipre/ fu: 14.4/7.8 Cpre/ fu: 14.0/5.2		
Good	Age range 2–8 years (mean: 5.45, SD: 1.5), race/ethnicity: 64% White, 21% African American, 2% Hispanic, 6% other ethnic origin							
Ahrens (2002) <sup>51</sup>	Type of trauma: community trauma/mixed trauma Topeka KS	Eight 60-minute sessions over 8 week period.	Follow up occurred 4 weeks after treatment ended; 12 weeks after pre-test	Wait-list control group	Convenience	Beck Depression Inventory (BDI)	1.14	
Greatest	Study dates not specified	Conducted by female doctoral candidate and female psychologist			Randomly assigned at individual level	Ipre/ fu: 15.3/6.9	0.96	
Good	Incarcerated youth who met criteria for PTSD. Many youth had some form of trauma history				Ipre: n = 19 Cpre: n=19 Ipost: n=19 Cpost: n=19	Cpre/ fu: 18.5/18.0 PTSD Symptom Scale Self-Report (PSS-SR) Ipre/ fu: 16.9/7.8 Cpre/ fu: 19.4/20.4		
	Age range 15–18 years (mean: 16.4 yrs), race/ethnicity: 61% White; 26% African American; 5% Hispanic; 5% Native American; 3% Other							

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**Appendix.** Summary tables of studies included in the reviews (*continued*)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up		Assignment to treatment conditions Sample size (at pre/post assessments)		
Kataoka (2003) <sup>47</sup> Greatest Fair	Los Angeles Unified School District January–June 2000 Our review focused only on the children who exhibited PTSD symptoms at pretest in this investigation. Latino immigrant children in grades 3–8 in participating schools, exhibiting PTSD and depression symptoms and had been exposed to community violence. Mean age: 11.4 years (SD: 1.7); race/ethnicity: 57% born in Mexico	Eight sessions over 8 week period. Each session lasted length of one school period. Clinicians delivering intervention received 16 hrs of training, and 2 hrs/week ongoing supervision. Followed detailed treatment manual	Follow up occurred approximately 3 months after baseline	Wait-list control group	Convenience Randomized at individual level, however some individual assigned to intervention group non-randomly Ipre: n=182 Cpre: n=47 Ipost: n=152 Cpost: n=46	Children's Depression Inventory (CDI) Ipre/ fu: 23/ 18 Cpre/ fu: 24/ 23 Child PTSD Symptom Scale (CPSS) Ipre/ fu: 20/ 13 Cpre/ fu: 19/ 16	0.33 0.38
Stein (2003) <sup>45</sup> Greatest Fair	East Los Angeles Late 2001–early 2002 6th graders who reported exposure to violence and clinical levels of PTSD symptoms Mean age: 11.0 years (SD: 0.3); race/ethnicity: Primarily Latino.	10 sessions over 10 week period, sessions lasted one class period. Conducted by trained school mental health clinicians	3 month follow-up obtained at completion of therapy	Wait-list control group	Convenience Randomized at individual level Ipre: n=61 Cpre: n=65 Ipost: n=54 Cpost: n=63	Child PTSD Symptom Scale Ipre/ fu: 24.4/8.9 Cpre/ fu: 23.5/15.5 Child Depression Inventory Ipre/ fu: 17.6/9.4 Cpre/ fu: 16.7/12.7	1.0 0.46
Type of trauma: war Ehnholt (2005) <sup>54</sup> Greatest Fair	South and North London Study dates not specified Teachers referred refugee or asylum-seeking students to the study. I mean age: 12.47 years, C mean age: 13.46 years, range: 11–15 years old; nationality: Kosovo 42.30%, Sierra Leone 38.46%, Turkey 11.53%, Afghanistan 3.85%, Somalia 3.85%	6 group sessions over 6 week period, sessions lasted 1-hour during class time Conducted by clinical psychology trainee	Pre and post assessments occurred. Post assessment occurred after post treatment for the intervention group and at the end of the intervention-free waiting period for the control group	Wait-list control group	Convenience Group allocation was not random, based on students' availability. Ipre: n=15 Cpre: n=1 Ipost: n=15 Cpost: n=11	Revised Impact of Event Scale (RIES) I pre (SD)/post (SD): 39.80 (8.40)/33.80 (9.71) C pre (SD)/post (SD): 38.55 (8.37)/42.18 (9.38) Birlson Depression Self-Rating Scale (DSRS) Ipre (SD)/post (SD): 12.33 (4.70)/11.67 (3.62) Cpre (SD)/post (SD): 12.00 (5.37)/13.00 (6.57) Children's Manifest Anxiety Scale (RCMAS) Ipre (SD)/post (SD): 16.87 (7.22)/14.67 (7.12) Cpre (SD)/post (SD): 16.18 (6.57)/18.91 (6.04)	1.02 0.33 0.75

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## Appendix. (continued)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection Assignment to treatment conditions Sample size (at pre/post assessments)	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up				
Type of trauma: childhood cancer							
Kazak (2004) <sup>53</sup> Greatest Good	Children's Hospital of Philadelphia PA Study dates not specified Childhood cancer survivors age 11 through 19 years, who had completed treatment 1–10 years previously, who were on the oncology tumor registry Mean age: 14.32 years, Range: 10.8 to 19.28 years; race/ethnicity: White 85%, Black 9%, Hispanic 5%, Asian 1%	4 group sessions over 1-day Conducted by psychologists, psychology postdoctoral fellows, psychology graduate students and interns, nurses, and social workers	Pre and post assessments occurred. Post assessment completed 3 to 5 months after the intervention	Wait-list control group	Convenience Randomized clinical trial Ipre: n=76 Cpre: n=4 Ipost: n=47 Cpost: n=64	Post-Traumatic Stress Disorder Reaction Index Ipre (CI)/post: 13.07 (10.84–15.05)/8.84 Cpre (CI)/post: 13.74 (10.86–16.97)/10.72	Data imputed, numerical values not calculated.
Studies measuring effect of Individual Cognitive Behavioral Therapy in children/adolescents							
Type of trauma: sexual abuse							
Barbe (2004) <sup>35</sup> Greatest Fair	Pittsburgh PA Sessions occurred from 1991–1995 Adolescents were recruited from outpatient clinic or who answered an advertisement and met diagnostic criteria for major depression met inclusion criteria Our review focused on the adolescents with a lifetime history of sexual abuse Mean age: 15.7 (SD: 1.4); Race/ethnicity: 60% White / 40% not reported	12–16 sessions of treatment delivered over 12–16 weeks Experienced therapists with roughly an average of 9 years experience	Assessments taken at baseline, 6 weeks, post-treatment, 3, 6, 9, 12, and 24 months after treatment. (Our review used baseline and post-treatment assessments)	Nondirective Supportive Therapy	Convenience Randomized control trial Ipre: n=6 Cpre: n=4 Ipost: n=5 Cpost: n=4	Presence of DSM-III-R major depression (assessed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present Episode and Epidemiologic versions along with self-reported depression using Beck Depression Inventory (BDI)) I pre/post: 5 (100%) / 2 (40%) C pre/post: 4 (100%) / 2 (50%)	(Relative change) 0.2

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## Appendix. Summary tables of studies included in the reviews (continued)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection Assignment to treatment conditions Sample size (at pre/post assessments)	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up				
Celano (1996) <sup>36</sup> Greatest Good	Atlanta GA Study dates not specified Participants were recruited from the pediatric emergency clinic of a large, public hospital (66%), the local statutory child protection agencies (28%) and victim's assistance programs of the court system (7%). The participants all had experienced contact sexual abuse within the past 3 year period Age range: 8 – 13 years, mean age: 10.5 years Race/Ethnicity: African-American 75%; Caucasian 22%, Hispanic 3%	Eight, 1 hour sessions over 8 week period Therapists were 5 professional clinicians and 10 trainees, all were provided with additional training and supervision in the area of child sexual abuse; 3 hour training, weekly supervision, treatment manual provided outlining theoretical rational and specific treatment activities	Assessments taken at baseline and post-treatment	Treatment as usual (supportive, unstructured psychotherapy)	Convenience Randomized control trial Ipre: n=15 Cpre: n=17 Ipost: n=14 Cpost: n=16	Child Behavior Checklist (PTSD) Ipre/post: 6.6/ 4.8 Cpre/post: 8.5/5.6 Child Behavior Checklist (Externalizing) Ipre/post: 55.1/51.2 Cpre/post: 66.2/58.6 Child Behavior Checklist (Internalizing) Ipre/post: 56.2/53.2 Cpre/post: 62.7/52.3	0.24 0.52 0.69
Cohen (1996), <sup>88</sup> (1997) <sup>31</sup> Greatest Good	Pittsburgh PA Study dates not specified Participants were referred from regional rape crisis centers, Child Protective Services, pediatricians, psychologist, community mental health agencies, county and municipal police departments, and from the judicial system. Child had to have experienced some form of sexual abuse (anal, genital, oral, breast contact), with most recent episode occurring no more than 6 months before referral to the study Age: Mean age: 4.68 yrs; Range: 2–7 yrs; Race/Ethnicity: 54% Caucasian, 42% African-American, 4% other	Received 12, 1.5 hr treatment sessions; Duration 12–16 weeks Treatment provided by master's level clinicians. Protocol manual-based. Therapists extensively trained, supervision provided	Assessments taken at pre, post, 6 mos and 12 mos	Non-directive supportive therapy	Convenience Randomized control trial. Ipost: n = 28 Cpost: n=15	Child Behavior Checklist (Externalizing) Ipre/12 mos: 64.7/53.6 Cpre/12 mos: 62.6/59.8 Child Behavior Checklist (Internalizing) Ipre/12 mos: 64.8/52.9 Cpre/12 mos: 62.7/57.5	0.73 0.59

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## Appendix. (continued)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention			Other components (study arms, if any) Comparison	Sample selection Assignment to treatment conditions Sample size (at pre/post assessments)	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up					
Cohen (1998, <sup>89</sup> 2005) <sup>37</sup> Greatest Fair	Pittsburgh PA Study dates not specified Participants were referred from a variety of sources, including victim advocacy programs, Child Protective Services, police, juvenile and family court, private practitioners, and other mental health providers. Trauma was contact sexual abuse Mean age: 11 yrs; age range 7–15 yrs; Race/Ethnicity: 59% Caucasian; 37% African American, 2% Hispanic, 2% biracial	12 sessions over a 12-week period, 18 total hours of therapeutic intervention Master's level social workers with experience working with parents and child sexual abuse programs administered therapy	Assessments taken at pre, post, 6 mos and 12 mos	Non-directive supportive therapy	Convenience Randomized control trial Ipre: n=30 Cpre: n=23 Ipost: n=9 Cpost: n=16	Child Behavior Checklist (Externalizing) Ipre/12 mos: 57.6/55.9 Cpre/12 mos: 56.2/55.4 Child Behavior Checklist (Internalizing) Ipre/12 mos: 56.2/52.5 Cpre/12 mos: 57/54.4 Child Depression Inventory Ipre/12 mos: 12.4/8.9 Cpre/12 mos: 11.7/10.2 Trauma Symptom Checklist for Children (TSC-C) (PTSD) Pre/12 mos Ipre/post: 10.6/7.2 Cpre/post: 10.8/9.6 State-Trait Anxiety Inventory for Children for anxiety Pre/12 mos Ipre/post: 35.3/30.7 Cpre/post: 34.5/32.4	0.06 0.09 0.29 0.46 0.34	
Cohen (2004) <sup>38</sup> Greatest Good	Location not specified Study dates not specified Sexually abused children were recruited from two sites. Both sites are academically affiliated outpatient clinical treatment programs for abused/traumatized children. Referral sources included CPS, police, victim advocacy centers and child advocacy centers, pediatric care providers, mental health care providers, and self-referrals Age: Range 8–14 yr; Mean: 10.76 yr; Race/Ethnicity: White 60%; African American 28%; Hispanic American 4%; Biracial 7%; Other 1%	12 weekly individual sessions lasting 90 minutes Therapists with professional training (i.e., psychologists, social workers) administered	Assessments taken pre and post treatment	Child-centered therapy	Convenience Randomized control trial Ipre: n=114 Cpre: n=115 Ipost: n=89 Cpost: n=91	Child Behavior Checklist (Externalizing) Ipre/post: 15.6/11.1 Cpre/post: 17.2/13.8 Child Depression Inventory Ipre/post: 9.9/5.7 Cpre/post: 12.1/8.8 State-Trait Anxiety Inventory for Children for anxiety Ipre/post: 30.5/26.2 Cpre/post: 31.5/27.8	0.13 0.13 0.09	

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Appendix. Summary tables of studies included in the reviews (continued)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection Assignment to treatment conditions Sample size (at pre/post assessments)	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up				
Deblinger (1996), <sup>90</sup> (1999) <sup>99</sup> Greatest Good	Location not specified Study dates not specified Participating families recruited following a forensic medical examination conducted at the Center for Children's Support. Representatives from the Division of Youth and Family Services and the prosecutor's office were also encouraged to refer non-offending parents and sexually abused children Our review focused on the child-only treatment Age: Mean: 9.84 years (SE: 2.01); Range 7- 13 yrs; Race/Ethnicity: 72% Caucasian, 20% African American, 6% Hispanic, 2% other ethnic origin	12 weekly 45-minute treatment sessions Mental health therapists trained in experimental cognitive behavioral interventions administered	Assessments taken at pre, post, 3 mos, 6 mos, 12 mos, and 24 mos	Comparison received Standard Community Care	Convenience Randomized control trial Ipre: n=25 Cpre: n=25 Ipost: n = 24 Cpost: n=22	Child Behavior Checklist (Externalizing) Ipre/24 mos: 18.8/12.3 Cpre/24 mos: 14.9/19.2 Child Depression Inventory Ipre/24 mos: 9.8/5.3 Cpre/24 mos: 11.9/8.1 State-Trait Anxiety Inventory for Children for anxiety Ipre/24 mos: 28.4/26.2 Cpre/24 mos: 31.1/29.5 Schedule for Affective Disorders and Schizophrenia for School-Age Children (S-SADS-E) (PTSD) Pre/24 mos Ipre/24 mos: 8.9/3.0 Cpre/24 mos: 9.8/4.4	1.03 0.18 0.27 0.16
King (2000) <sup>40</sup> Greatest Good	Australia Study dates not specified Sexually abused children were referred from sexual assault centers, the Department of Health and Community Services, mental health professionals, medical practitioners and school authorities Our review focused on the child only treatment Age: Mean 11.5 years; range: 5-17 years; Race/Ethnicity: Not discussed	20 weekly 50 minute sessions in child only CBT Registered psychologists administered	Assessments at pre, post, and 12 weeks	Wait-list control	Convenience Randomized control trial Ipre: n=24 Cpre: n=12 Ipost: n=9 Cpost: n=10	PTSD section of ADIS Ipre/12 weeks : 13.3/8.7 Cpre/12 weeks: 12.8/10.9 Revised Children's Manifest Anxiety Scale (RCMAS) Ipre/12 weeks: 55.9/46.0 Cpre/12 weeks: 156.7/55.1 Child Depression Inventory Ipre/12 weeks: 16.8/11.2 Cpre/12 weeks: 17.3/13.8 Child Behavior Checklist (Internalizing) Ipre/12 weeks: 72.3/63.4 Cpre/12 weeks: 68.9/66.2 Child Behavior Checklist (Externalizing) Ipre/12 weeks : 67.2/60.6 Cpre/12 weeks: 64.6/65.4	0.86 0.56 0.22 0.58 0.61
Type of trauma: physical abuse Kolko (1996) <sup>41</sup> Greatest Good	Pittsburgh PA Study dates not specified Physically abused children referred from child protective services, agency referral, or parental self-referral Mean age: 8.6 years (SD: 2.2 ); Race/Ethnicity: African-American 47%, Caucasian 47%, Biracial 6%	At least 12 1-hour weekly clinic sessions within a 16 week period Administered by 6 female clinicians, all had prior specialty training and experience	Assessments at pre, post, 3 mos, and 12 mos	Comparison group: Routine Community Services	Convenience Randomization of part of sample Ipre: n=25 Cpre: n=12 Ipost: n=20 Cpost: n=10	Child Behavior Checklist (Externalizing) Ipre/12 mos: 65.3/60.7 Cpre/12 mos: 63.2/62.7 Child Depression Inventory Ipre/12 mos: 8.8/5.8 Cpre/12 mos: 13.4/9.1	0.27 0.13

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## Appendix. (continued)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention			Sample selection Assignment to treatment conditions Sample size (at pre/post assessments)	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up	Other components (study arms, if any) Comparison			
Lange (2001) <sup>42</sup> Greatest Fair	Type of trauma: mixed trauma/trauma symptoms The Netherlands Study dates not specified Participants had experienced a traumatic event at least 3 months prior to intervention. They were recruited from a pool of 500 students in return for course credit points Mean age: 22 years (SD: 4.9); range: 18–37 years; Race/Ethnicity: Not discussed	10 writing sessions, two times per week over 5 weeks, 45 minutes each 6 female graduate students and 1 male student in clinical psychology conducted the treatment, under supervision	Assessments at pre/post only	Wait-list control	Convenience Randomized control trial Ipre: n=15 Cpre: n=15 Ipost: n=13 Cpost: n=12	Symptom Checklist (SCL)-90 depression subscale Ipre/post: 29.9/21.1 Cpre/post: 27.2/26.8	1.42
Lytle (2002) <sup>43,a</sup> Greatest Good	Location not specified Spring of 1990 Undergraduate students with total Impact of Events Scale score greater than 0 were contacted; potential participants also completed self-report diagnostic measures of PTSD and generalized anxiety disorder Mean age: 18.9 years (SD: 1.64); Race/Ethnicity: 93% Caucasian; 4% African-American; 2% Indian (SE Asian)	Three sessions 1 week apart Administered by clinical psychology doctoral students experienced as therapists	Pre and post assessment only Post one week after treatment	Comparison received non-directive therapy	Convenience Randomized Control Trial Ipre: n=16 Cpre: n=16 Ipost: n=15 Cpost: n=15	Beck Depression Inventory (BDI) I pre/post: 10.0/6.5 C pre/post: 11.3/5.9 State-Trait Anxiety Inventory Ipre/post: 21.9/18.7 Cpre/post: 23.6/20.9	0.29 0.05

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**Appendix.** Summary tables of studies included in the reviews (*continued*)
 

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Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection Assignment to treatment conditions Sample size (at pre/post assessments)	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up				
Scheck (1998) <sup>44,a</sup> Greatest Fair	Colorado Springs CO Study dates not specified Participants recruited by information and fliers advertising the study to several municipal agencies in Colorado Springs, including the El Paso Co. Dept of Health and Environment, Municipal Court Diversion Program, El Paso County Legal Assistance, and District 2 Alternative School. Also recruited by referrals from helping agencies or when young adults came for an appointment at the STD clinic Mean age: 20.93 yrs Age range: 16–25 yrs Race/Ethnicity: Caucasian:62% African American: 15% Hispanic: 15% Native American: 8%	Participants attended two 90-min therapy sessions approximately 1 week apart Therapy conducted by 24 licensed or supervised volunteer therapists recruited from the community	Pre, post, and 3 month follow up	Control received active listening therapy	Convenience Randomized Control Trial Ipre: n=30 Cpre: n=30 Ipost: n=20 Cpost: n=12	Beck Depression Inventory Ipre/3 mo: 21.5/5.3 Cpre/3 mo: 26.4/14.3 Impact of Event Scale Ipre/3 mo: 48.4/15.8 Cpre/3 mo: 48.7/26.2 State-Trait Anxiety Inventory (STATE): Ipre/3 mo: 52.4/35.2 Cpre/3 mo: 53.1/44.5	0.36 0.75 0.58
Studies measuring effect of Play Therapy in children/adolescents Type of trauma: witness domestic violence Kot (1998) <sup>60,b</sup> Moderate Fair	Location not specified Study dates not specified Volunteer participants (mothers and children) were recruited from battered women's shelters. Children had witnessed domestic violence Mean age: 6.9 years, range: 4–10 years; Race/ethnicity: 46% Caucasian, 27% Hispanic, 27% African-American	Participants received 12, 45-minute sessions of intervention over a period of 12 days to 3 weeks Delivered by 2 counselors completing their master's and 1 counselor who was completing a doctoral degree	Pre and post measurements only	Wait-listed control, but also received 3–4 educational and recreational group sessions per week provided by shelter staff	Convenience Not randomized Ipre: n=20 Cpre: n=20 Ipost: n=11 Cpost: n=11	CBCL Total Behavior Problems Ipre/post:28.6/21.2 Cpre/post: 42.9/45.6	0.69

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## Appendix. (continued)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection Assignment to treatment conditions Sample size (at pre/post assessments)	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up				
Smith (2003) <sup>63,b</sup> Moderate Fair	Location not specified Study dates not specified Participants recruited from 2 shelters (a domestic violence shelter and a homeless shelter); must be a victim of domestic violence and their children must have been a witness of domestic violence Experimental group: children age: mean: 6.1, range: 4–10; Experimental group race/ethnicity: Caucasian 36.4% Arabic 9.1% Hispanic 9.1% African American 45.4%	12, 1.5 hr sessions over 2–3 weeks. Intervention group also received what control group received Doctoral candidate with play training administered	Pre and post measurements only	Control received 3–4 educational and recreational group sessions per week provided by shelter staff	Convenience Not randomized, not concurrent Ipre: n=14 Cpre: n=11 Ipost: n=11 Cpost: n=11	Child Behavior Checklist (CBCL) Scales: Externalizing Ipre/post: 14.5/9.4 Cpre/post: 18.7/20.1 Aggressive Ipre/post: 11.9/7.8 Cpre/post: 16.2/17.7 Anxious/Depressed Ipre/post: 9.3/4.4 Cpre/post: 6.7/6.9	1.24 1.10 0.84
Tyndall-Lind (2001) <sup>64,b</sup> Moderate Fair	Location not specified Study dates not specified Volunteer participants (mothers and children) were recruited from battered women's shelters in a large metroplex area. Children had witnessed domestic Mean age: 6.2 years, range: 4–9 years; Race/ethnicity: 60% Caucasian, 20% Hispanic, and 20% African-American	Received 12 sessions of Intensive sibling group play therapy, 2 siblings in each group. Sessions were 45 minutes in length conducted daily over 12 days. Intervention group also received what control group received Administered by 2 masters level and 3 doctoral counselors, all trained in play therapy	Pre and post measurements only	Wait-listed control, but also received 3–4 educational and recreational group sessions per week provided by shelter staff	Convenience Not randomized Ipre: n=20 Cpre: n=20 Ipost: n=10 Cpost: n=11	Child Behavior Checklist (CBCL) Scales: Aggressive Ipre/post: 14.7/11.3 Cpre/post: 16.2/17.7 Anxious/Depressed Ipre/post: 9.5/6.3 Cpre/post: 6.7/6.9	0.72 0.61
Type of trauma: natural disaster Shen (2002) <sup>62</sup> Greatest Fair	Midwestern Taiwan Study dates not specified Children exposed to the 9/21/ 1999 earthquake and its aftershocks and who were identified as high risk for maladjustment Age range: 8–12 years Race/ethnicity: Chinese	Ten 40-minute group play therapy sessions over a 4-week span. Each group met 2–3 times per week Sessions conducted by a school counselor with child-centered play therapy training	Pre and posttests measurements approximately 1 month apart	Controls did not receive any treatment	Randomized Ipre: n=15 Cpre: n=15 Ipost: n=15 Cpost: n=15	Revised Children's Manifest Anxiety Scale (RCMAS) Ipre/1 mo.: 18.0/13.4 Cpre/1 mo.: 17.1 /17.0 Multiscore Depression Inventory for Children (MDI-C) Ipre/1 mo.: 35.0/29.7 Cpre/1 mo.: 41.1 /36.5 Suicide Risk Scale Ipre/1 mo.: 0.40/0.01 Cpre/1 mo.: 0.53/0.46	(Relative change) 0.25 0.04 0.97

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**Appendix.** Summary tables of studies included in the reviews (continued)

Author & year Design suitability Quality of execution	Location Study period Population	Intervention		Other components (study arms, if any) Comparison	Sample selection	Effect measure calculated from study findings	Adjusted g
		Frequency and duration Personnel administering	Follow-up		Assignment to treatment conditions Sample size (at pre/post assessments)		
Study measuring effect of Art Therapy in children/adolescents Type of trauma: non-abusive physical trauma Schreier (2005) <sup>66</sup> Greatest Fair	Oakland CA 1998–2002 Potential participants were identified using the hospital's trauma registry. Children were hospitalized for a minimum of 24 hours after (non-abusive) physical trauma Mean age 10.6 years, SD 2.6 years, range 7 to 17 years; Race/Ethnicity: White 47%, African-American 31%, Hispanic 13%, Asian Pacific Islander 6%, Native American 1%, Other 1%	One 1-hour session Deliverer not described	Pre, 1 month, 6 months, and 18 months assessments occurred	Control group received standard hospital services	Convenience Randomized Ipre: n=27 Cpre: n=30 Ipost + Cpost: n=34	UCLA PTSD-RI: Child PTSD Reaction Index Ipre/1 mo.: 28.0 /19.7 Cpre/1 mo.: 24.6 /21.9	(Relative change) 0.21
Study measuring effect of Psychodynamic Therapy in children/adolescents Type of trauma: witness domestic violence Lieberman (2005) <sup>68</sup> Greatest Fair	Location not specified Study dates not specified Mother-child dyads were referred to study from family court, domestic violence service providers, medical providers, preschools, other agencies, child protective services, former clients, and self-referrals. Referred due to clinical concerns about the child's behavior or mother's parenting after the child witnessed or overheard marital violence Age: Mean: 4.06 (SD 0.82), Range: 3–5 yrs; Race/Ethnicity: 38.7% mixed ethnicity (predominantly Latino/white); 28% Latino, 14.7% African American, 9.3% white, 6.7% Asian, 2.6% other	Weekly CPP child-mother sessions lasting approximately 60 minutes were conducted over the course of 50 weeks Administered by PhD clinician	Pre and post measurements only	Control received case management plus individual psychotherapy	Convenience Randomized control trial Ipre: n=36 Cpre: n=29 Ipost: n=30 Cpost: n=25	DC 0-3 TSD (Semistructured Interview for Diagnostic Classification DC: 0-3) Ipre/post: 8.0/4.4 Cpre/post: 7.1/6.7	(Relative change) 0.42

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## Appendix. (continued)

Author & year	Location	Intervention			Other components (study arms, if any)	Sample selection	Assignment to treatment conditions	Effect measure calculated from study findings	Adjusted g
		Frequency and duration	Follow-up	Personnel administering					
Study measuring effect of Pharmacological Therapy in children/adolescents									
Type of trauma: severe burn									
Robert (1999) <sup>73</sup>	Shriners Burns Hospital, Galveston, TX	Imipramine prescribed on evening of symptom onset. Dose 1mg/kg administered nightly at 8:30PM. The maximum dose was 100mg.	Pre- and post- measurements only	Controls administered chloral hydrate each evening at 8:30PM. Dose 25mg/kg, with a maximum 500mg.	Prospective, randomized, double-blind design		Number and intensity of Acute Stress Disorder symptoms at baseline and daily	RR = (10/12)/(5/13) - 1 = 1.17	
Greatest								2= 5,24,	
Fair	Children who presented with acute stress disorder symptoms during their first hospitalization after a burn injury							df=,	p=.04
Age: Mean age 8 years									
Race/Ethnicity: Not discussed									
Type of trauma: child abuse									
Famularo (1988) <sup>74</sup>	Location not specified	Propranolol hydrochloride	B-A-B (off-on-off) medication design	No control group	Convenience		Childhood PTSD Inventory Scores	(Relative change)	
Moderate	Study dates not specified				All subjects first received no treatment, then treatment, then no treatment.		P1/P2/P3		
Good	Children presented to an outpatient psychiatry clinic in a general pediatric hospital, an inpatient residential facility or a juvenile court clinic for child evaluation in which severe child abuse is alleged	administered three times per day, starting dosage 0.8 mg/kg/d, gradually increased over two week period until top dosage of 2.5 mg/kg/d achieved. Children continued to receive individual therapy			Ipre: n=11 Ipost: n=11		I mean: 39/26/36		0.31
Age: Mean age 8.5 years									
Race/Ethnicity: Not discussed									
Physician researcher									
Studies measuring effect of Psychological Debriefing in children/adolescents									
Type of trauma: motor vehicle crash									
Stallard (2006) <sup>80</sup>	Bath, England	Received one session of clinician-administered, manual-based psychological debriefing	Baseline assessment approximately 1 month after accident and follow up assessment approximately 8.5 months after accident	Controls received non-accident focused discussion Not specified who administered	Convenience		Impact of Events Scale	(Relative change)	
Greatest	22 months from August 2000– May 2002				Randomized		Pre/post		
Good	Children admitted to the emergency department following a road traffic accident				Ipre: n=82 Cpre: n=76 Ipost: n=70 Cpost: n=52		I 22.6/16.3 C 26.2/17.0		0.11 0.07
Age range: 7–18 years, mean: ~15 yrs									
Race/ethnicity: not described									
Revised Children's Manifest Anxiety Scale									
Pre/post									
I 10.0/7.9 C 11.5/8.5									
Birleson Depression Inventory									
Pre/post									
I 8.5/7.3 C 9.9/8.2									

<sup>a</sup>Eye movement desensitization<sup>b</sup>Studies not independent; all used same control group from Kot (1998)<sup>60</sup>

C, comparison group; fu, follow up; I, intervention group; mo, month; n, sample size; pre, pre-intervention; post, postintervention; yr, year