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RESEARCH ARTICLE

Cognitive behavioral treatments for children and adolescents exposed to traumatic events: A meta-analysis examining variables moderating treatment outcomes

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Abstract

Due to the negative impact of trauma exposure, effective treatments are necessary to prevent and improve negative trauma-related outcomes. Cognitive behavioral therapy (CBT) is considered an efficacious treatment for children and adolescents exposed to traumatic events. Despite the various meta-analyses that have examined trauma treatments, there is a paucity of research on the moderating variables that may impact treatment outcomes. This meta-analytic CBT study addressed those limitations by examining the moderating effects of treatment components on outcomes. A search identified 94 CBT studies with 97 relevant effect sizes for children and adolescents exposed to traumatic events. Consistent with prior meta-analytic studies, CBT was shown to be effective for trauma-exposed youth. CBT subtreatments did not produce significantly different results from one another. Moderators shown to significantly impact CBT treatment outcomes for posttraumatic stress symptom were trauma type, $Q = 24.09$, $p = .004$, $ds = -0.22$ to -1.42, and gender, $Q = 10.68$, $p = .005$, $ds = -0.53$ to -1.36, whereas moderators shown to impact treatment outcomes for depression were study design, $Q = 10.95$, $p = .004$, $ds = -0.26$ to -0.50, and treatment setting, $Q = 10.98$, $p = .004$, $ds = -0.31$ to -0.56. The implications of these findings for research and practice are discussed.

Among children and adolescence, there is a high prevalence of exposure to at least one traumatic event, with rates among national samples ranging from 41% (Zinzow et al., 2009) to 83% (Ford et al., 2010) in the United States. According to the American Psychiatric Association (2013), a traumatic event involves "exposure to actual or threatened death, serious injury, or sexual violence" (p. 271). Research has shown that children and adolescents who are exposed to traumatic events are at risk of negative outcomes. For example, youths who are exposed to traumatic events may have a variety of mental health concerns, including anxiety and depression (De Young et al., 2011), and are at risk for poor academic performance, lower IQ scores, and lower language abilities (Perfect et al., 2016). In certain cases, significant negative outcomes may result in trauma- and stress-related disorders, such as posttraumatic stress disorder (PTSD). According to a review of 43 independent samples of trauma-exposed children and adolescents, 15% of these youths met the criteria for PTSD (Alisic et al., 2014).

There are numerous treatments (e.g., psychological, psychopharmacological) used with children and adolescents who have been exposed to traumatic events and struggle with the resulting mental health challenges. The American Academy of Child and Adolescent Psychiatry (AACAP) Official Action report (2010) on treatment

guidelines recommends that psychological treatment should be the initial course of action in treating child and adolescent PTSD, and the American Psychological Association (2008) specifically name cognitive behavioral therapy (CBT) as an effective treatment approach for children and adolescents exposed to traumatic events. Additionally, although prior meta-analyses have shown various psychological treatments to be efficacious, the evidence base for psychological treatment of children and adolescents exposed to traumatic events indicates that CBT and therapies that consist of CBT components (i.e., psychoeducation, cognitive processing of thoughts and beliefs, relaxation and coping skills training, imaginal exposure; Silverman et al., 2008) produce the strongest outcomes (Gillies et al., 2012; Gutermann et al., 2016; Kowalik et al., 2011; Silverman et al., 2008; Slade & Warne, 2016).

Studies that have examined the general efficacy of psychological treatments (Gillies et al., 2012; Kowalik et al., 2011) have shown effect sizes for CBT to be higher than those for control groups. Moreover, the treatments have been shown to affect various psychological constructs, such as PTSD, depression, and internalizing symptoms. Some prior meta-analyses (Silverman et al., 2008; Slade & Warne, 2016) have also shown CBT to be more effective than other trauma treatments. Although prior meta-analyses have examined the general efficacy of CBT, there is limited research on the moderating factors that could impact CBT treatment outcomes for trauma-exposed children and adolescents. Moderator variables refer to variables that describe the circumstances under which something occurs, and they typically refer to the population or setting in which therapeutic change occurs (Silverman & Hinshaw, 2008). By examining moderator variables, researchers and clinicians can better understand for whom and under what conditions a particular treatment is effective (Silverman & Hinshaw, 2008), which can inform practice.

The present meta-analytic study addressed two research questions. First, we asked: What is the overall impact of CBT and CBT subtreatments (i.e., specific trauma-informed CBT protocols developed by researchers) on improving mental health outcomes (i.e., posttraumatic stress symptoms [PTSS], anxiety symptoms, depression symptoms) in children and adolescents? Do outcomes vary by trauma treatments? Second, we aimed to examine whether trauma type, cultural factors, study design, treatment setting, parental involvement, length of treatment, or frequency of treatment moderate the effectiveness of CBT treatment for children and adolescents.

METHOD

The current study used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009) to investigate the impact of CBT on outcomes, and the moderating variables of treatment effects.

Search strategy

To conduct a comprehensive literature search and find an appropriate number of studies for meta-analytic purposes (Lipsey & Wilson, 2000), we completed a thorough search of relevant databases for studies that met inclusion criteria in February 2019. For the present meta-analysis, the following databases were searched with no limitation on publication date in the following databases: PsycINFO, EBSCO, ERIC, and ProQuest Dissertations and Theses. Peer reviewed articles and dissertations (i.e., research that did not undergo journal peer review) were used. From these databases, the following keywords were used in the literature search: (1) child* OR adolesc* OR youth OR teen* OR pediatric OR young, (2) PTSD OR posttrauma* OR post-trauma* OR "post trauma*" OR trauma* (3) "cognitive behavior*" OR CBT OR treatment OR intervention OR therapy OR psychotherapy, and (4) "physical* abuse*" OR "physical violence" OR neglect OR maltreat* OR mistreat* OR "domestic violence" OR "child* abuse*" OR "sexual* abuse*" OR fire OR explosion OR refugee OR war OR hurricane OR tsunami OR tornado OR earthquake OR flood OR "natural disaster" OR terror* OR shooting OR massacre OR kidnap* OR witnes* OR victim OR "adverse childhood."

To identify other potential studies, we also examined the reference sections of articles found during the keyword search as well as the reference sections of prior meta-analytic studies (i.e., Gillies, et al., 2012; Gutermann et al., 2016; Kowalik et al., 2011; Silverman et al., 2008; Slade & Warne, 2016). Finally, direct requests via email were sent to 14 prominent researchers of CBT for children and adolescents exposed to traumatic events to inquire about unpublished studies. As shown in Figure 1, the initial search produced 22,334 articles, 3,062 of which were duplicates. We identified 18 additional relevant articles through examinations of the reference sections of prior meta-analyses (k = 3) and in the references sections of articles identified in the initial search (k = 15); no articles were included based on communications with researchers.

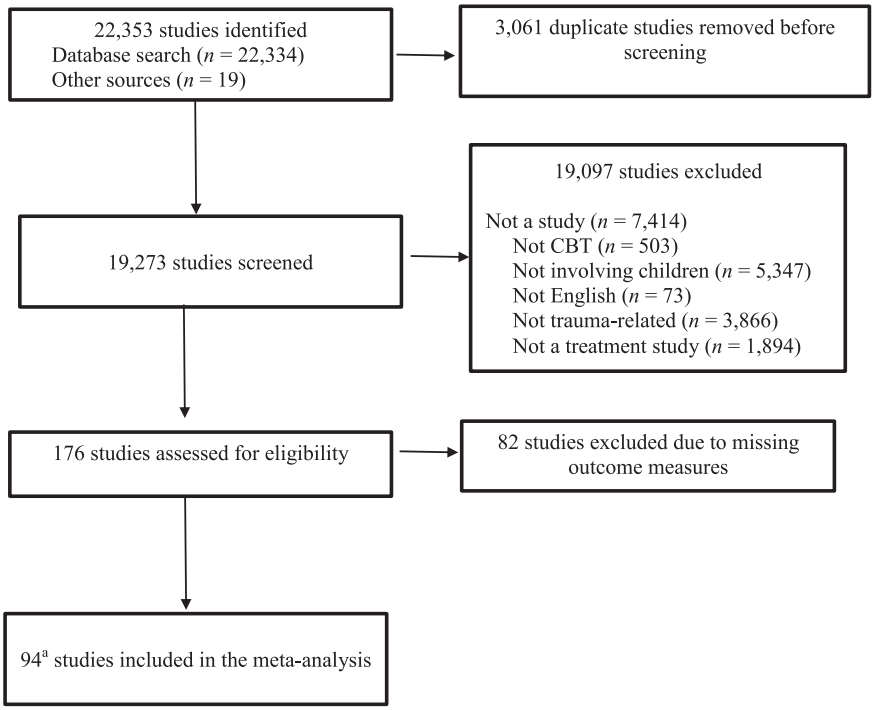

FIGURE 1 Flowchart of Meta-Analysis Phases. *Note*: [a]94 studies that produced 97 effect sizes were included in the meta-analysis

Inclusion criteria

To be included in the meta-analysis, articles were required to (a) contain original data (i.e., be a treatment outcome study, not a literature review of treatment), (b) include individuals 18 years or younger in the sample, (c) involve participants who have been exposed to traumatic events, (d) involve treatment that used cognitive behavioral techniques (i.e., psychoeducation, relaxation and coping techniques, cognitive training, and imaginal exposure), and (e) be written in English. All components of CBT had to be included. Studies that examined both the efficacy (i.e., randomized controlled trials [RCTs]) and effectiveness (i.e., naturalistic, pre–post) of treatment were included.

In total, 94 articles met all the inclusion criteria. Three of these studies involved more than one relevant comparison group in relation to the purpose of this meta-analysis, resulting in three of the studies contributing a second effect size estimate. Each effect size estimate was independent of the others. Thus, the total sample comprising 97 effect sizes (i.e., distinct data points from 94 studies) was available for the meta-analysis. Information on the included studies is available in Supplementary Table S1. Of the 97 data points from 94 studies, 95 had PTSS outcome data, 39 had anxiety symptom outcome data, and 65 had depressive symptom outcome data. Although a number of the included studies had data regarding other outcome variables, we only investigated data related to PTSS, anxiety symptoms, and depressive symptoms.

Data collection process and data analysis

All data coding procedures were tracked using Microsoft Excel. The data coding involved two steps. In the first step, the primary author completed an initial search and screening to exclude studies that did not meet the inclusion criteria (see Figure 1). For the purposes of interrater reliability, a second coder examined a random selection of 10% of the initially identified articles to determine if they met the inclusion criteria without a correction for chance agreement. There was 99% agreement between raters. Studies that appeared to meet the inclusion criteria were coded independently by the primary author and a second coder for accuracy and reliability. The data coded included variables such as type of analysis, cultural data (i.e., race/ethnicity, gender, age), information on outcomes, treatment type, and type of study (i.e., clinical vs. naturalistic). A random selection of 10% of the included articles was coded by the second coder for interrater reliability purposes, with 96% agreement between raters.

Measures used to determine change

Mental health functioning and behavior changes for trauma treatments were measured across studies. Treatment studies typically used self-report measures or, if self-report measures were not used, parent-report measures.

Because higher scores on outcome measures indicate higher symptom levels, negative effect sizes indicate a better outcome for children and adolescents exposed to CBT interventions when compared with a control group or pretreatment outcomes.

Moderator variables

The following treatment moderators were coded and included in this study: trauma exposure (i.e., natural disaster, physical abuse, sexual abuse, single incident trauma, terrorism, traumatic grief, various traumas, violence, war-related trauma, other), predominant race in a given sample (i.e., Black/African American, Hispanic/Latinx, White/European American), gender (i.e., female only, male only, mixed), study design (i.e., pre–post, quasi-experimental, RCT), treatment setting (i.e., clinic, community, hospital outpatient, school, university, other), parental involvement, the inclusion of other treatment techniques, treatment delivery (i.e., individual, group), session frequency (i.e., biweekly, three times a week, weekly, other), age, session length, and number of sessions.

Data analysis

The data-analysis package Comprehensive Meta-Analysis (CMA; Version 3; Borenstein et al., 2005) was used to conduct all analyses. For RCTs, posttest differences between control and experimental groups were examined to calculate the standardized mean difference (i.e., Cohen's *d*). For studies that did not report means and standard deviations as well as studies that used designs without a control group, the standardized mean difference was calculated in CMA by using the *t* value or *p* value (Borenstein et al., 2005). The effect sizes for non-RCT studies were calculated by dividing the unstandardized mean score (i.e., posttest mean minus pretest mean) with the pooled standard deviation of pre- and posttest scores. A random-effects model was used to examine the effect size for each study. Each study's effect size was recorded, and the overall effects were calculated using CMA (Borenstein et al., 2005). Further, a random-effects mixed-effects model (i.e., meta-regression) was used to statistically examine the variation in effect sizes that were accounted for by the proposed moderator variables. Effect sizes were interpreted using Cohen's (1988) benchmarks of 0.2, 0.5, and 0.8 to represent small, medium, and large effects, respectively. Because nonsignificant study results are less likely to be published than significant study results, a forest plot analysis was conducted, and a failsafe *N* value was calculated through CMA to examine the potential impact of nonpublication (Lipsey & Wilson, 2000). The Michigan State University's Institutional Review Board granted this project "exempt" status.

RESULTS

There was a diverse array of samples in the 94 studies included in the present meta-analysis. Geographically, 44 studies were conducted in the United States, whereas 49 studies were conducted internationally; one study did not report location. As the construct of race varied across countries, racial identity was only examined for studies conducted in the United States. Three United States–based studies did not report predominant racial identity data. Overall, there were Asian/Asian American participants in seven studies, biracial participants in 19 studies, Black/African American participants in 38 studies, Hispanic/Latinx participants in 33 studies, Native American participants in 10 studies, and White/European American participants in 34 studies. Regarding gender, 12 studies examined female-only samples, four studies examined male-only samples, and 77 studies examined mixed-gender samples; one study did not report gender data. Participant age ranged from 3 years to 18 years old in the included samples.

Overall effect and subtreatment effectiveness

As shown in Table 1, the overall standardized mean difference indicated a medium effect for PTSS ($k = 95$); $d = -0.57$, 95% CI [−0.48, 0.66], and a small effect for anxiety symptoms ($k = 39$), $d = -0.40$, 95% CI [−0.29, −0.51], and depressive symptoms ($k = 65$), $d = -0.40$, 95% CI [−0.33, −0.47]. Heterogeneity was considered substantial across the effect sizes for PTSS ($k = 95$), $I^2 = 85.04$, $Q = 628.35$, $p < .001$; anxiety symptoms ($k = 39$), $I^2 = 69.50$, $Q = 124.60$, $p < .001$; and depressive symptoms ($k = 65$), $I^2 = 51.36$, $Q = 131.59$, $p < .001$. Additionally, because the *Q* statistics were all statistically significant ($p < .001$), dispersion was likely not due to random error; a statistically significant *Q* test result rejects the assumption of homogeneity of variance among effect sizes, suggesting the presence of nonrandom between-study variance. There were likely real differences in the between-study effects based on these analyses; thus, moderator analyses were used to examine variables that may have impacted outcomes.

Of the 94 studies that produced 97 effect sizes, 78 involved 23 specific subtreatments, and 16 studies examined general CBT treatments. As shown in Table 2, the subtreatments examined for PTSS were Cognitive

TABLE 1 Summary of initial meta-analytic results

	k[a]	Standard difference in *M*	*SE*	Variance	95% CI	*Z*	*Q*[b]	I^2[c]	Failsafe *N*[d]
Random effects									
PTSS	94	−0.57***	0.045	0.002	[−0.66, −0.48]	−12.60	628.35***	85.04	7078
Anxiety	38	−0.40***	0.058	0.003	[−0.51, −0.29]	−6.94	124.60***	69.50	1451
Depression	64	−0.40***	0.036	0.001	[−0.47, −0.33]	−11.15	131.59***	51.36	4411

Note: PTSS = posttraumatic stress symptoms.

[a]Number of independent samples that contributed to an effect size. [b] Variability among effect sizes; the *Q* statistic is tested for significance at the $p < .05$ level. [c]Proportion of the observed variance reflecting real differences in effect sizes. [d] Number of studies with an effect of 0 that would be necessary to lead to nonsignificant overall results.

***$p < .001$.

Behavioral Intervention for Trauma in Schools (CBITS; $k = 5$), d = -0.53; Combined Parent–Child CBT for Families at Risk for Child Physical Abuse (CPC-CBT; $k = 3$), $d = -1.23$; Enhancing Resiliency Amongst Students Experiencing Stress (ERASE Stress; $k = 4$), $d = -0.51$; game-based CBT (GB-CBT; $k = 3$), $d = -0.38$; prolonged exposure (PE) therapy for adolescents (PE-A; $k = 5$), $d = -0.46$; Teaching Recovery Techniques (TRT; $k = 12$), $d = -0.32$; and trauma-focused CBT (TF-CBT; $k = 28$), $d = -0.66$. The remaining subtreatments were consolidated into the "other" category ($k = 35$), $d = -0.56$, due to the small number of studies available. The standardized mean effects ranged from small to large. Based on the results, the mean effects of the subtreatments were not significantly different from one another. The subtreatments examined for depressive symptom outcomes were CBITS ($k = 5$), $d = -0.41$; TRT ($k = 10$), $d = -0.25$; and TF-CBT ($k = 17$), $d = -0.44$. The remaining subtreatments were consolidated into the "other" category ($k = 33$), $d = -0.42$, due to the small number of studies available. The standardized mean effects indicated a small effect size for all subtreatments. Based on the results, the mean effects of CBITS, TRT, TF-CBT, and other treatments for reducing PTSS and depressive symptoms were not significantly different from one another. Subtreatment analyses were not conducted on anxiety symptom outcomes due to the limited number of studies available per subtreatment.

Moderator analyses

Tables 2 and 3 show the results of the moderator analyses. It should be noted that age (range: 3–18 years), session length (range: 30–120 min), and number of sessions (range: one to 23 sessions) were conceptualized as continuous variables. All other moderator variables were conceptualized as categorical.

Moderator analyses for studies with PTSS outcomes

The standardized mean effects for trauma type ranged from small to large, ds = -0.22 to -1.42, and they varied significantly ($k = 95$), $Q = 24.09$, $p = .004$, with studies that examined physical abuse demonstrating the largest pooled effect size. This indicates that trauma type was a significant moderator variable in reducing PTSS. The standardized mean effects for the predominant race in the sample, which was used to examine racial identity, were in the small-to-medium range, ds = -0.47 to -0.63, and the mean effect sizes were not significantly different from one another ($k = 37$), $Q = 0.79$, $p = .673$. The effect sizes were in the medium-to-large range, ds = -0.53 to -1.36, for gender, and they were significantly different from one another ($k = 94$), $Q = 10.68$, $p = .005$, with male-only studies demonstrating the largest effect size; this indicates that gender was a significant moderator variable in reducing PTSS. The final cultural variable examined was age, which was examined as a moderator through meta-regression analysis. The results indicated that age was not a significant moderator variable in reducing PTSS ($k = 94$), R^2 = -.006.

The effect sizes for study design were in the small-to-medium range, ds = −0.48 to −0.64, and they were not significantly different from one another ($k = 95$), $Q = 2.21$, $p = .331$. The effect sizes for treatment setting ranged from a small to large, ds = −0.43 to −1.18, and they were not significantly different from one another ($k = 94$), $Q = 10.11$, $p = .072$. For parental involvement, the effect sizes were in the medium range, ds = −0.52 to −0.60, and were not significantly different from one another ($k = 95$), $Q = -0.73$, $p = .689$. These analyses included treatment that used only CBT as well as treatments that used other techniques in addition to CBT, and the effect sizes were in the medium range, $d = -0.55$ to −0.58, and not significantly different from one another ($k = 95$), $Q = 0.05$, $p = .831$. For treatment delivery, the effect sizes were in the medium

TABLE 2 Moderator analysis data by subtreatment, trauma exposure, race, gender, and age

	PTSS			Anxiety			Depression		
Variable	***k***	***d***	**95% CI**	***k***	***d***	**95% CI**	***k***	***d***	**95% CI**
Subtreatment									
CBITS	5	−0.53**	[−0.88, −0.19]				5	−0.41***	[−0.63, −0.19]
CPC-CBT	3	−1.23***	[−1.74, −0.72]						
ERASE Stress	4	−0.51**	[−0.90, −0.13]						
GB-CBT	3	−0.38	[−0.85, −0.10]						
PE-A	5	−0.46*	[−0.85, −0.06]						
TRT	12	−0.32**	[−0.56, −0.08]				10	−0.25**	[−0.42, −0.08]
TF-CBT	28	−0.66***	[−0.83 −0.50]				17	−0.44***	[−0.58, −0.31]
Other	35	−0.56***	[−0.71 −0.42]				33	−0.42***	[−0.52, −0.33]
Trauma exposure									
Natural disaster	10	−0.57***	[−0.82, −0.31]				7	−0.46***	[−0.66, −0.26]
Physical abuse	4	−1.42***	[−1.91, −0.94]				3	−0.85***	[−1.26, −0.44]
Sexual abuse	28	−0.59***	[−0.75, −0.44]	18	−0.41***	[−0.57, −0.25]	21	−0.37***	[−0.49, −0.25]
Single incident	3	−1.02**	[−1.61, −0.42]	3	−0.76**	[−1.29, −0.24]	3	−0.66**	[−1.13, −0.20]
Terrorism	3	−0.22	[−0.65, 0.21]				3	−0.26	[−0.55, −0.02]
Traumatic grief	4	−0.84***	[−1.22, −0.45]				4	−0.47***	[−0.71, −0.23]
Various	13	−0.62***	[−0.84 −0.39]	3	−0.57*	[−1.00, −0.13]	8	−0.57***	[−0.80, −0.35]
Violence	4	−0.58**	[−1.01, −0.14]				3	−0.37*	[−0.66, −0.07]
War-related	20	−0.38***	[−0.55, −0.21]	6	−0.20	[−0.47, 0.06]	7	−0.21*	[−0.39, −0.04]
Other	7	−0.42**	[−0.74, −0.11]	9	−0.41***	[−0.64, −0.18]	6	−0.40**	[−0.64, −0.15]
Predominant race									
Black/African American	13	−0.47**	[−0.74, −0.20]	3	−0.35*	[−0.65, −0.05]	9	−0.38***	[−0.58, −0.18]
Hispanic/Latinx	6	−0.58**	[−0.97, −0.19]	4	−0.31*	[−0.61, −0.02]	6	−0.27*	[−0.48, −0.05]
White/EA	18	−0.63***	[−0.85, −0.41]	12	−0.42***	[−0.58, −0.27]	16	−0.47***	[−0.60, −0.34]
Gender									
Female only	12	−0.64***	[−0.90, −0.38]	4	−0.55**	[−0.87, −0.22]	7	−0.33**	[−0.51, −0.13]
Male only	4	−1.36***	[−1.85, −0.86]						
Mixed	78	−0.53***	[−0.62, −0.43]	34	−0.38***	[−0.51, −0.25]	55	−0.40***	[−0.47, −0.33]
Age	94			38			64		

Note: Subtreatment: $Q = 12.97$ for PTSS, $Q = 3.70$ for depression. Trauma exposure: $Q = 24.09^{*}$ for PTSS, $Q = 4.49$ for anxiety, $Q = 14.19$ for depression. Predominant race: $Q = 0.79$ for PTSS, $Q = 0.49$ for anxiety, $Q = 2.67$ for depression. Gender: $Q = 10.68^{**}$ for PTSS, $Q = 0.87$ for anxiety; $Q = 0.63$ for depression. Age: $R^2 = -0.006$ for PTSS; $R^2 = 0.007$ for anxiety, $R^2 = 0.02$ for depression. PTSS = posttraumatic stress disorder; CBITS = Cognitive Behavioral Intervention for Trauma in Schools; CPC-CBT = combined parent–child cognitive behavioral therapy (CBT); ERASE-Stress = Enhancing Resiliency Amongst Students Experiencing Stress; GB-CBT = game-based CBT; PE-A = prolonged exposure therapy for adolescents; TRT = Teaching Recovery Techniques; TF-CBT = trauma-focused cognitive behavioral therapy; EA = European American.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

TABLE 3 Moderator analysis data, by study design, treatment setting, parental involvement, and other treatment characteristics

	PTSS			Anxiety			Depression		
Variable	***k***	***d***	**95% CI**	***k***	***d***	**95% CI**	***k***	***d***	**95% CI**
Study design									
Pre-Post	48	−0.62**	[−0.74, −0.50]	19	−0.50***	[−0.65, −0.34]	31	−0.50***	[−0.58, −0.41]
Quasi-Exp	8	−0.64***	[−0.93, −0.34]	4	−0.47**	[−0.80, 0.14]	6	−0.35***	[−0.53, −0.17]
RCT	39	−0.48***	[−0.63, −0.33]	16	−0.23*	[−0.42, −0.04]	28	−0.26***	[−0.37, −0.15]
Treatment setting									
Clinic	3	−0.66	[−1.36, 0.03]						
Community	32	−0.64***	[−0.77, −0.48]	13	−0.47***	[−0.67, −0.27]	22	−0.56***	[−0.68, −0.44]
Hospital outpatient	3	−0.44	[−0.91, 0.04]						
School	31	−0.43***	[−0.57, −0.30]	11	−0.24*	[−0.43, −0.04]	21	−0.31***	[−0.41, −0.21]
University	3	−1.18***	[−1.72, −0.63]						
Other	22	−0.63***	[−0.81, −0.45]	15	−0.48***	[−0.67, −0.30]	22	−0.35***	[−0.47, −0.23]
Parental involvement									
Included	50	−0.60***	[−0.73, −0.48]	21	−0.39***	[−0.55, −0.22]	32	−0.48***	[−0.58, −0.37]
Not included	35	−0.52***	[−0.66, −0.37]	14	−0.37***	[−0.57, −0.18]	28	−0.34***	[−0.44, −0.24]
Other treatments									
Included	19	−0.55***	[−0.75, −0.36]	7	−0.41**	[−0.67, −0.16]	13	−0.48***	[−0.63, −0.33]
Not included	76	−0.58***	[−0.68, −0.47]	32	−0.40***	[−0.53, −0.27]	52	−0.38***	[−0.46, −0.30]
Treatment delivery									
Individual	48	−0.60***	[−0.73, −0.47]	21	−0.44***	[−0.62, −0.27]	30	−0.40***	[−0.52, −0.28]
Group	41	−0.57***	[−0.70, −0.44]	15	−0.44***	[−0.63, −0.26]	32	−0.38***	[−0.47, −0.29]
Session frequency									
Biweekly	5	−0.17	[−0.61, 0.27]				3	−0.17	[−0.52, −0.18]
Three a week	4	−0.47*	[−0.92, −0.02]						
Weekly	52	−0.60***	[−0.72, −0.48]				40	−0.39***	[−0.47, −0.30]
Other	34	−0.58***	[−0.72, −0.43]				22	−0.44***	[−0.55, −0.33]
Session length	64			27			40		
Number of sessions	83			33			56		

Note: Study design: $Q = 2.21$ for PTSS, $Q = 4.73$ for anxiety, $Q = 10.95^{**}$ for depression. Treatment setting: $Q = 10.11$ for PTSS, $Q = 3.92$ for anxiety, $Q = 10.98^{**}$ for depression. Parent involvement: $Q = -0.73$ for PTSS, $Q = 1.05$ for anxiety, $Q = 3.49$ for depression. Other treatments: $Q = 0.05$ for PTSS, $Q = 0.01$ for anxiety, $Q = 1.33$ for depression. Treatment delivery: $Q = 2.82$ for PTSS, $Q = 3.77$ for anxiety, $Q = 1.75$ for depression. Session frequency: $Q = 3.59$ for PTSS, $Q = 2.21$ for depression. Session length: $R^2 = -0.0007$ for PTSS, $R^2 = 0.002$ for anxiety, $R^2 = -0.002$ for depression. Number of sessions: $R^2 = -0.01$ for PTSS, $R^2 = 0.001$ for anxiety, $R^2 = 0.004$ for depression. PTSS = posttraumatic stress disorder; Quasi-exp = Quasi-experimental; RCT = randomized controlled trial.

*$p < .05$, **$p < .01$, ***$p < .001$.

range, ds = −0.57 to −0.60, and they were not significantly different from one another (k = 95), Q = 2.82, p = .244. Session length was examined as a moderator through meta-regression analyses, and the results indicated that session length was not a significant moderator variable (k = 64), R^2 = −.0007. Effect sizes for treatment frequency were in the small-to-medium range, d = −0.17 to −0.60, and they were not significantly different from one another (k = 95), Q = 3.59, p = .309. Finally, the number of treatment sessions was examined as a moderator through meta-regression analyses, and the results indicated that the number of treatment sessions was not a significant moderator variable (k = 83), R^2 = −.01, in reducing PTSS.

Moderator analyses for studies with anxiety symptom outcomes

With regard to outcomes related to anxiety symptoms, the standardized mean effects for trauma type ranged from small to medium, ds = −0.20 to −0.76, and the mean effects between the different trauma exposure types were not significantly different from one another (k = 39), Q = 4.49, p = .344. Regarding racial identity, the predominant race in the sample was used for each study; the standardized mean effects were in the small range, ds = −0.31 to −0.42, and they were not significantly different from one another (k = 19), Q = 0.49, p = .783. The effect sizes for gender were in the small-to-medium range, ds = −0.38 to −0.55, and they were not significantly different from one another (k = 38), Q = 0.87, p = .350. The last cultural variable to be examined was age, and age was examined as a moderator through meta-regression analyses; the results indicated that age was not a significant moderator variable in reducing anxiety symptoms (k = 38), R^2 = −.006.

The effect sizes for study design were in the small-to-medium range, ds = −0.23 to −0.50, and they were not significantly different from one another (k = 39), Q = 4.73, p = .094. Due to limited study availability for various treatment settings (e.g., hospital, residential treatment facility), only community and school-based samples were used in the moderator analysis, and the mean effect sizes were in the small range, ds = −0.24 to −0.48, and were not significantly different from one another (k = 39), Q = 3.92, p = .141. The effect sizes for parental involvement were generally in the small range, ds = −0.37 to −0.39, and not significantly different from one another (k = 39), Q = 1.05, p = .593. These analyses included treatments that either used only CBT and treatments that used other techniques in addition to CBT, and the effect sizes were generally small, ds = −0.40 to −0.41, and not significantly different from one another (k = 39), Q = 0.01, p = .917. The effect sizes for treatment delivery were generally small, ds = −0.44, and they were not significantly different from one another (k = 36), Q = 3.77, p = .152. Session length was examined as a moderator through meta-regression analysis and was not found to be a significant moderator variable (k = 27), R^2 = −.002. We did not conduct an analysis of treatment frequency in relation to anxiety symptom outcomes due to the limited number of studies. The number of treatment sessions was examined as a moderator through meta-regression analysis, and the results indicated that the number of treatment sessions was not a significant moderator variable (k = 33), R^2 = −.0009, in the reduction of anxiety symptoms.

Moderator analyses for studies with depressive symptom outcomes

With regard to depressive symptom outcomes, the standardized mean effects of the trauma type ranged from small to large, ds = −0.21 to −0.85, and were not significantly different from one another (k = 65), Q = 14.19, p = .116. The standardized mean effects of racial identity, as examined through the predominant race in the sample, were generally in the small range, ds = −0.27 to −0.47, and were not significantly different from one another (k = 31), Q = 2.67, p = .264. Due to limited study availability for studies with male-only samples, we only examined female-only and mixed-gender samples in the moderator analyses, and the effect sizes for gender were generally in the small range, ds = −0.33 to −0.40, and not significantly different from one another (k = 62), Q = 0.63, p = .428. The final cultural variable, age, was not a significant moderator variable (k = 64), R^2 = .02, in the reduction of depressive symptoms.

The effect sizes for study design were in the small-to-medium range, ds = −0.26 to −0.50, and they were significantly different from one another (k = 65), Q = 10.95, p = .004, with pre–post studies demonstrating the largest effect size. This indicates that study design was a significant moderator variable in outcomes related to depressive symptom reduction. Due to the limited study availability for various treatment settings (e.g., hospital, residential treatment facility), only community, school-based, and other samples were used in the moderator analyses. The effect sizes ranged from a small to medium effect, ds = −0.31 to −0.56, and they were significantly different from one another (k = 65), Q = 10.98, p = .004, such that community-based studies demonstrated the largest effect size. This indicates that treatment setting was a significant moderator variable in depression symptom reduction. The effect sizes for parental involvement were generally in the small range, ds = −0.34 to −0.48, and they were not significantly different from one another (k = 65),

$Q = 3.49$, $p = .175$. With regard to treatments that included CBT elements alone or in combination with other techniques, the effect sizes were generally small, ds = −0.38 to −0.48, and they were not significantly different from one another ($k = 65$), $Q = 1.33$, $p = .249$. The effect size for treatment delivery were small, ds = −0.40 to −0.38, and they were not significantly different from one another ($k = 62$), $Q = 1.75$, $p = .417$. Session length was examined as a moderator through meta-regression analysis, and the results indicated there was no evidence that session length was a significant moderator variable ($k = 40$), $R^2 = -.001$. The effect sizes for treatment frequency were small, ds = −0.17 to −0.44, and not significantly different from one another ($k = 65$), $Q = 2.21$, $p = .331$. Number of treatment sessions was examined as a moderator through meta-regression analysis, and the results indicated that there was no evidence that number of treatment sessions was a significant moderator variable ($k = 56$), $R^2 = .004$.

Publication bias

For the main outcome measure analyses (i.e., PTSS analyses, anxiety analyses, depression analyses), a visual inspection of funnel plot symmetry suggested no publication bias. Further, the removal of outliers in the initial funnel plots resulted in a typical level of symmetry, also suggesting no publication bias. Another examination of potential publication bias was conducted through the analysis of failsafe *N*. As shown in Table 1, there would need to be 7,078 studies with a treatment effect of 0 to lead to a nonsignificant overall result for studies with PTSS outcomes, 1,451 studies with a treatment effect of 0 to lead to a nonsignificant overall result for studies with anxiety symptom outcomes, and 4,411 studies with a treatment effect of 0 to lead to a nonsignificant overall result for studies with depressive symptom outcomes.

DISCUSSION

The results of the present meta-analysis indicate that CBT for children and adolescents exposed to traumatic events significantly reduces PTSS, $d = -0.57$, $p < .001$; anxiety, $d = -0.40$, $p < .001$; and depressive symptoms, $d = -0.40$, $p < .001$, across a diverse array of measures, when compared to other trauma treatments (e.g., cue-centered therapy, eye movement desensitization and reprocessing) or waitlist control groups. Such symptom improvements are consistent with findings from prior meta-analyses of CBT outcome studies that have specifically examined PTSS, anxiety, and depressive symptoms (Gillies et al., 2012; Silverman et al., 2008). In line with previous meta-analyses (e.g., Morina et al., 2016) that have shown higher effects for PTSS (i.e., a decrease in symptom levels) compared with depression symptoms, the present findings show that mean effects were higher for PTSS than other outcomes (i.e., anxiety, depression). Consistent with treatment guidelines (e.g., American Psychological Association, AACAP), CBT is clearly effective in reducing mental health symptoms associated with traumatic event exposure. In sum, children and adolescents who experience a range of posttraumatic sequelae can be treated effectively with CBT.

This confirmation of CBT use in trauma-exposed children and adolescents is significant due to the prevalence of trauma exposure. Although exposure to a potentially traumatic event may not necessarily result in mental health concerns, prior researchers have found that 15% of children and adolescents experience PTSD following trauma exposure (Alisic et al., 2014). However, PTSD is not the only negative posttraumatic outcome. Depression and anxiety can also occur, and trauma exposure can also negatively impact performance in other areas of functioning, including academics and language skills (Perfect et al., 2016). Further, there can be long-term consequences when treatment does not occur. Substance use, for example, has been linked to trauma exposure (Cole et al., 2019), as children and adolescents try to find ways to cope with their experiences, possibly through unhealthy means. Thus, early intervention is needed to (a) identify children and adolescents who have been exposed to traumatic events and (b) determine which youths are experiencing symptoms that are negatively impacting their daily functioning and mental health. In doing so, practitioners can start to implement CBT soon after trauma exposure to mitigate the potential long-term impacts of these experiences, particularly the development of unhealthy coping mechanisms (e.g., substance use and abuse).

Five prior meta-analyses of which we are aware have examined the impact of CBT on trauma-exposed children and adolescents. However, these meta-analyses did not examine the possibility that subtreatments differentially impacted PTSS, anxiety, or depressive symptom outcomes (Dorsey et al., 2017; Harvey & Taylor, 2010; Kowalik et al., 2011; Silverman et al., 2008; Slade & Warne, 2016). The results of the present meta-analysis suggest that CBT subtreatments all positively impact PTSS, with one exception (i.e., GB-CBT). However, the present findings provide ample evidence in favor of TF-CBT, TRT, and CBITS as first-line treatments for trauma-exposed children and adolescents given the positive impact on primary (i.e., PTSS) and secondary (e.g., depressive symptom) outcomes.

The present meta-analysis was the first published study of which we are aware to examine the potential impact of a diverse range of moderators (e.g., gender, age, treatment setting) on a broad set of CBT treatment outcomes. This meta-analysis partially aligns with prior research

(Silverman et al., 2008) such that physical abuse had the highest effect, followed by single-incident trauma and traumatic grief (see Table 2). Further, there were significant decreases in PTSS, anxiety, and depressive symptom outcomes for children and adolescents exposed to most traumatic events, as seen in prior literature (Brown et al., 2017; Gutermann et al., 2016), but trauma type did not moderate anxiety and depressive symptom outcomes as anticipated. However, this could be explained by the limited study availability, and future research may be needed to determine if this result was due to genuine variance or the limited statistical power that resulted from the small number of available studies. Regardless, the present findings provide practitioners with evidence supporting the use of CBT regardless of the trauma type: Even individuals with the most severe possible outcomes (i.e., those exposed to traumatic events that occurred early in life and were chronic, interpersonal, and complex; Kliethermes et al., 2014) can potentially benefit from CBT. Further, because both individual and group-based treatments were found to be effective, practitioners who want to use CBT in ways that meet the needs of the largest number of children and adolescents seeking treatment (e.g., group therapy) can do so and be assured there is evidence showing that such delivery methods can be effective.

The study findings indicate that both male and female samples responded positively to CBT. Yet, this meta-analysis identified that for PTSS outcomes, male-only samples had significantly higher effect sizes compared with female-only or mixed-gender samples. This conflicts with prior meta-analytic research (Gutermann et al., 2016) suggesting that gender does not moderate PTSS outcomes. However, Lindebø Knutsen and colleagues (2020) found that participants in female samples did not respond to TF-CBT as well as those in male samples, which may support the more positive PTSS outcomes for boys exposed to CBT in this meta-analytic study. Even though the male-only samples did demonstrate more symptom improvement, both groups were shown to benefit from treatments that included CBT components; thus, practitioners can use CBT with these two gender groups with confidence that there is evidence to support the benefits of CBT for children and adolescents.

In the present meta-analysis, study design emerged as a moderator variable that impacted treatment outcomes for depressive symptoms. Past research has not examined the impact of study design on depressive symptom outcomes; thus, this meta-analysis contributes to the literature by providing evidence of this link. Future researchers will need to examine why pre–post studies had a more positive impact on treatment outcomes than RCTs and investigate the role individual clinicians may have in producing these outcomes in naturalistic settings. This meta-analysis provides evidence of the need for more naturalistic work to understand how treatment functions in real-world settings.

The present study further adds to the literature by providing evidence that treatment setting moderates depressive symptom outcomes, with community settings yielding a larger effect than school settings. Brown and colleagues (2017) found that teachers who implemented treatment had lower PTSS effect sizes than mental health professionals, which aligns with the idea that treatment administered by certain school personnel does not have as much of an impact on trauma-related symptoms as treatment delivered by mental health professionals. The current findings support the idea that school settings may be less impactful with regard to depressive symptoms; however, it should be noted that there was a significant decrease in almost all outcomes (i.e., PTSS, anxiety, depressive symptoms) after CBT regardless of setting. Further, two of the subtreatments examined, CBITS and TRT, are implemented in schools. Thus, although the present findings show that CBITS and TRT significantly reduced depressive symptoms, we also observed a contrary finding that school-based treatment may not be as impactful as treatment delivered in other settings. This data suggests that CBITS and TRT may be the preferable form of treatment in school settings, whereas other forms of school-based treatment may not be as impactful. The findings also suggest that further research is likely needed with regard to school-based treatment, particularly because identifying effective treatments that can be conducted in school settings increases equitable access to treatment.

It is also noteworthy that racial identity, as examined via the predominant race in a given sample, did not moderate PTSS, anxiety, or depressive symptoms. This implies that children and adolescents from Black or African American, Hispanic or Latinx, and White or European American backgrounds made similar gains after engaging in CBT. Because individuals from racially minoritized groups are less likely to access mental health care services and more likely to drop out of treatment (Atdjian & Vega, 2005; Fraynt et al., 2014), the treatment implemented must provide evidence of positive results to promote treatment buy-in; this meta-analysis provides evidence of the benefits of CBT if children and adolescents remain in treatment. Further research is needed to determine how to best engage children and adolescents from racially minoritized groups, promote culturally responsive practices, and mitigate treatment drop-out. The present findings also provide evidence that age does not moderate treatment outcomes, suggesting that all children and adolescents, regardless of age, benefit from treatment. This finding indicates that practitioners can begin to implement CBT early in a child's life to reduce the likelihood the patient will develop poor coping skills, such as substance use.

Further, parental involvement, the inclusion of treatment techniques beyond CBT, treatment delivery, session frequency, session length, and session number were not shown not moderate decreases in PTSS, anxiety, or depressive symptoms. This implies that a diverse array of CBT treatments with varying components (e.g., varying session lengths and session frequencies) can result in positive outcomes and reductions in PTSS, anxiety, and depressive symptoms. Additionally, although anxiety also demonstrated a high level of heterogeneity, none of the examined moderators were statistically significant; thus, there may be one or more moderators that were not examined in the present study that impacted anxiety outcomes. These results should be interpreted with caution, and generalization regarding moderator impact may be limited, as the significant moderators varied depending on the outcome measure.

A strength of the present meta-analysis is its provision of ample evidence of the impact of CBT on trauma-exposed children and adolescents. It should be noted, though, that further research is needed on the long-term effects of CBT, as this study specifically examined the symptom outcome scores immediately after treatment and did not include follow-up data. Yet another study strength was our examination of moderator variables, specifically those related to a given sample's cultural characteristics. This aids in the understanding of how generalizable these treatment findings are across the general population and the countries in which the treatments were studied. However, gaps in the research remain. Specifically, there are variables related to racial identity (e.g., Asian/Asian American, Indigenous, biracial), trauma type (i.e., racial trauma, generational trauma, neglect), socioeconomic status, sexual orientation, gender identity, and physical and mental health comorbidity that need to be examined. Further, youths involved in the juvenile justice system and those in residential placement facilities should be included in future studies. Future researchers should also report cultural variables that were not commonly found in the 94 studies and, thus, could not be examined herein (e.g., sexual orientation, gender identity, consistent socioeconomic status data, specific mental health comorbidity). These are important variables to include to better elucidate for whom treatment works.

Although there were data showing the inclusion of treatment techniques beyond CBT (e.g., body-oriented exercise, play therapy), the only analyses we could conduct were on whether or additional treatment techniques were used; we could not assess the impact of these additional techniques. More research on specific techniques that are used in addition to CBT is needed to determine which practices may make treatment more effective. More research is also needed to examine if there is a specific treatment technique outside of CBT that is more effective than the others. This can help both researchers and practitioners better understand the mechanisms of change that impact treatment outcomes among trauma-exposed children and adolescents. Furthermore, as practitioner theoretical orientation (e.g., psychodynamic, cognitive behavioral, family systems, eclectic) may vary, it is important that researchers study and know what extra components are included in CBT in naturalistic, real-world settings and how well these techniques work in addition to CBT.

Overall, the present findings contribute significantly to the literature. We examined the impact of CBT on PTSS, anxiety, and depressive symptom outcomes, with the goal of allowing researchers and practitioners to better understand which treatments work for children and adolescents exposed to traumatic events. The present results also provide data regarding CBT subtreatments and how various subtreatments impact treatment outcomes. Further, this meta-analysis found specific moderators (i.e., trauma type, gender, study design, treatment setting) were statistically significant for only some treatment outcomes (i.e., PTSS, depression symptoms) while others (e.g., predominant race in a sample, different age groups, parental involvement) were not found to be statistically significant for any treatment outcomes (i.e., PTSS, anxiety, and depression symptoms). However, though there were statistically significant moderators, there was evidence of the positive impact for children and adolescents exposed to trauma across various conditions. With the findings of this meta-analysis, researchers and practitioners can better understand for whom and under what circumstances CBT positively impacts outcomes for children and adolescents exposed to traumatic events.

OPEN PRACTICES STATEMENT

The study reported in this article was not formally preregistered. Neither the data nor the materials have been made available on a permanent third-party archive; requests for the data or materials can be sent via email to the lead author at yohanna1@msu.edu.

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