Child Abuse & Neglect 92 (2019) 106–115

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

Research article

Child and family traumatic stress intervention (CFTSI) reduces parental posttraumatic stress symptoms: A multi-site meta-analysis (MSMA)

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ARTICLE INFO

Keywords:
Parental traumatic stress
Caregiver traumatic stress
Early intervention
Child and family traumatic stress intervention
CFTSI
Multi-site meta-analysis

ABSTRACT

Background: Following traumatization, caregiver support is a crucial factor contributing to children's successful management of posttraumatic reactions and their recovery. Caregivers who have been traumatically impacted themselves, however, may be compromised in this posttraumatic caregiving role. Although there are a number of evidence-based child trauma treatments that are effective in reducing children's trauma symptoms, the impact of child treatment on participating caregiver's posttraumatic symptoms (PTS) has received less attention.
Objective: Explore PTS reduction caregivers experience through participation in their child's evidence-based trauma-focused mental health treatment.
Participants and setting: 640 Child-Caregiver dyads referred for the Child and Family Traumatic Stress Intervention (CFTSI) following formal disclosure of abuse in a Child Advocacy Center (CAC).
Methods: Data were collected from 10 community treatment sites trained in CFTSI. A multi-site meta-analytic approach was used to evaluate pooled and site-specific therapeutic effect sizes for caregivers and children.
Results: CFTSI was associated with significant changes (Hedge's $g = 1.17$, Child-rated; $g = 0.66$, caregiver-rated) in children's PTS and with clinically meaningful improvements in PTS for 62% of participating caregivers who had started CFTSI with clinical levels of PTS as measured by the Post Traumatic Checklist–Civilian Version (PCL-C). The overall mean PCL-C change (9.31, SD = 12.9) in paired, pre-post PCL-C scores is close to a clinically meaningful change of 10 or higher. There was a robust moderate pooled effect size ($g = 0.70$, $N = 640$, $p < 0.0001$).
Conclusion: The value of a reduction in caregiver PTS as a secondary outcome of children's trauma-focused treatment is discussed.

1. Introduction

In the aftermath of traumatic experiences, family social support is a significant factor contributing to children's success in managing posttraumatic reactions, as well as in the reduction of children's posttraumatic stress (PTS) symptom levels (Cox, Kenardy, & Hendrikz, 2008; Hill, Levermore, Twaite, & Jones, 1996; Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012). Moreover, it

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https://doi.org/10.1016/j.chiabu.2019.03.010
Received 9 November 2018; Received in revised form 6 February 2019; Accepted 4 March 2019

is widely recognized that primary caregivers can play a critical role in helping children reconcile aversive experiences and develop emotional self-regulation (National Academies of Sciences & Medicine, 2016; Petersen, Joseph, & Feit, 2014). However, due to their trauma histories, or to their involvement in (or reactions to) events which impact their children, caregivers may themselves be traumatically impacted. The extent to which caregivers are suffering from their traumatic reactions may, in turn, influence their ability to serve effectively in a caregiving role at a time when a child is particularly vulnerable following traumatization (Knott & Fabre, 2014).

Parents with their own trauma histories are more likely to have negative views of themselves as caregivers (Sherman, Gress Smith, Straits-Troster, Larsen, & Gewirtz, 2016) and to report more problems in their relationships with, and perceptions of, their children (Creech & Misca, 2017; van Ee, Kleber, & Jongmans, 2015). A longitudinal study of intrafamilial sexual abuse found that mothers of sexually abused females who were themselves sexually abused reported the most unstable and harsh childhoods, the most current psychological distress, the least emotional support from family, and the least supportive parenting (Trickett, Noll, & Putnam, 2011). Furthermore, caregivers with PTS symptoms are more likely to endorse the use of harsh and aggressive parenting practices, including both moderate (e.g., pushing) and severe (e.g., hitting with a fist) physical aggression with their children (Leen-Feldner, Feldner, Bunaciu, & Blumenthal, 2011). Hyperaroused, hypervigilant, avoidant, or over-indulgent responses by traumatized caregivers toward traumatized children can potentiate a child's acute physiological responses and predict persistent posttraumatic symptomatology (Nugent, Ostrowski, Christopher, & Delahanty, 2007). A meta-analytic review of the literature examining the role of parenting behaviors in childhood posttraumatic distress found that negative parenting (hostility, overprotection) was significantly associated with child PTSS, accounting for 5.3% of the variance in childhood PTSS (Mean ES 0.23, $p < 0.0001$)(Williamson et al., 2017).

Children of parents with PTSD are at greater risk for poorer social adjustment, as well as heightened levels of anxiety and depression (Cicchetti & Toth, 2009; Ostrowski et al., 2011); they also have been found to have greater levels of emotional and behavioral problems (Kreaiori, Klari, Petrov, & Mihi, 2016; Selimbasic, Sinanovic, Avdibegovic, Brkic, & Hamidovic, 2017). Further, recent studies document the relationship between parental and child PTSD symptoms, demonstrating significant correlations between parent PTSD and child PTSD symptoms (Hagan et al., 2017; Morris, Gabert-Quillen, & Delahanty, 2012; Wise & Delahanty, 2017), as well as increased risk for child abuse and PTSD among those children whose parents have PTSD (Cross et al., 2018). Although the deleterious effects of parental PTSD on children's functioning are now well-established, the process or processes by which these changes are mediated continues to be an important area of research.

The trauma treatment field now includes several child treatment models with strong evidence supporting their effectiveness in reducing children's posttraumatic symptoms. Several of these evidence-based models protocolize the involvement of a parent or supportive caregiver in treatment including Trauma-Focused Cognitive Behavioral Therapy (TF-CBT), Child Parent Psychotherapy (CPP) and the Child and Family Traumatic Stress Intervention (CFTSI) (Cohen, Mannarino, & Deblinger, 2017; Epstein, Hahn, Berkowitz, & Marans, 2017; Lieberman, Van Horn, & Ippen, 2005). Accordingly, given parents' critical role in their children's recovery and the impact that parental trauma symptoms have on children, the effect of child trauma treatment models on participating caregivers is an important area of investigation. In a randomized controlled comparison of TF-CBT ($N = 71$) to treatment as usual (TAU) ($N = 64$), investigators found that parents' emotional reactions and depressive symptoms decreased significantly from pre- to post-therapy, but they found no significant differences between the two treatment conditions with respect to depressive scores at the end of treatment (t (132) = 1.69, $p = .094$) (Holt, Jensen, & Wentzel-Larsen, 2014). Moreover, a second RCT comparing TF-CBT ($N = 40$) to a waitlist condition ($N = 40$) found a significant time effect $F(1, 82) = 2.55$, $p = 0.02$, without a time-group interaction $F(1, 82) = 1.09$, $p = 0.30$, suggesting a similar reduction in parental depressive symptoms in the TF-CBT and waitlist groups. Across both conditions, most of the parents remained unchanged (74%), some of them improved (20%), and a few worsened (6%) (Tutus, Keller, Sachser, Pfeiffer, & Goldbeck, 2017). In an open treatment study of 199 parents who participated in Child Parent Psychotherapy (CPP), latent difference score analysis showed that PTSS decreased significantly by more than 0.5 SD for parents and children (Hagan et al., 2017). In the present study, we explored the benefits that caregivers derived concerning their own traumatic stress symptom reduction from participating in a brief evidence-based child trauma treatment model by utilizing a multi-site meta-analytic approach to evaluate the pooled and site-specific therapeutic effect sizes in data collected by 10 Child Advocacy Centers (CACs).

1.1. The child and family traumatic stress intervention (CFTSI)

The child and family traumatic stress intervention (CFTSI) is a manualized mental health treatment that has demonstrated efficacy in reducing children's trauma symptoms and as a result, decreasing the probability of full-fledged PTSD and related disorders in children (Berkowitz, Stover, & Marans, 2011; Epstein et al., 2017; Hahn, Oransky, Epstein, Stover, & Marans, 2015; Marans, 2013; Oransky, Hahn, & Stover, 2013). CFTSI is designed to be implemented with children ages 7–18 and their non-offending caregivers during the days and weeks immediately following a potentially traumatic event or the formal disclosure of physical or sexual abuse (such as in a forensic interview); CFTSI is implemented in 5–8 sessions. CFTSI targets traumatic reactions including intrusion symptoms, avoidance, alterations in arousal and negative alterations in cognition. These may impact the child across physical, affective, cognitive and emotional domains. The goals of CFTSI include: (a) increasing caregiver understanding of the child's posttraumatic experience, as well as their own posttraumatic experience; (b) improving child and caregiver capacity to observe and recognize trauma reactions; (c) increasing caregiver support of the child by enhancing communication between the child and caregiver about the child's trauma symptoms; (d) teaching coping strategies to help the child and caregiver master traumatic reactions; and (e) improving screening and assessing the need for longer-term mental health treatment or other services.

The CFTSI protocol calls for clinicians to identify caregiver PTS symptoms through the pre- and post-intervention administration

of a standardized symptom assessment. As such, assessment of caregiver's PTS symptoms serves three goals in CFTSI: (a) to help the clinician understand how the caregiver is impacted by his or her symptoms; (b) to help the caregiver gain mastery over symptoms and regain a sense of control; and (c) to inform the clinician about the possible need for a referral for a caregiver's treatment, as per the standard CFTSI protocol. In order to help the caregiver gain mastery over trauma symptoms and thus regain a greater sense of control, the clinician first helps the caregiver improve self-observing capacity about their symptoms, as well as the ability to identify trauma reminders that give rise to those symptoms. Caregivers then learn strategies to effectively manage the symptoms they have now successfully identified (e.g., establishment of structured, predictable routines; focused breathing; guided imagery; sleep hygiene, etc.).

In a randomized controlled study of CFTSI, 112 participants aged 7–17 years (mean age = 12) were referred from a child maltreatment forensic service, an urban police department, and a pediatric emergency department following exposure to a potentially traumatic event. Those who endorsed at least one new and distressing symptom of PTSD on the Posttraumatic Checklist–Civilian (PCL; (Weathers, Littz, Huska & Keane, 1994)) within 30 days of the PTE were randomized using a block design to CFTSI ($N = 53$) or an active 4-session comparison condition that included psychoeducational components and the teaching of coping skills ($N = 53$). The RCT outcome focused on the diagnosis of PTSD immediately after the intervention ($N = 86$) and again three months post-intervention, as measured by the UCLA PTSD Reaction Index (PTSD-RI) for DSM IV (Pynoos, Rodriguez, Steinberg, Stuber, & Frederick, 1998). Logistic regression, controlled for new, potentially traumatic events, examined group differences in PTSD diagnosis at three months post-treatment ($N = 83$). Three months following the end of treatment, the CFTSI group was significantly less likely to have PTSD ($\beta = -1.063$, $p = .046$), reducing the odds of a full diagnosis of PTSD by 65% and the odds of partial or full PTSD by 73% ($\beta = -1.32$, $p = .008$) (Berkowitz et al., 2011).

A chart review of CFTSI cases ($N = 114$) completed following disclosure of sexual abuse during a forensic interview in a Child Advocacy Center (CAC) examined: (a) caregiver and child agreement concerning the child's trauma history, child's PTSD and mood symptoms, and children's functional impairment while controlling for caregivers' symptoms (Oransky et al., 2013); and (b) outcomes of treatment in a CAC setting (Hahn et al., 2015). The children in the sample, 86.8% female, ranged from 7 to 16 years of age ($M = 10.72$, SD = 2.69) and caregivers were predominantly mothers. We measured child PTSD symptoms using Part I, and functional impairment using Part II of the Child PTSD Symptom Scale (CPSS) (Foa, Johnson, Feeny, & Treadwell, 2001). We assessed caregiver PTSD symptoms using the PCL-C (Weathers et al., 1994). Children reported significantly higher rates of PTSD and mood symptoms as compared to caregiver rating of children's symptoms ($t(110) = 4.94$, $p < .001$). Parent–child discrepancies were positively correlated with children's greater self-reported PTSS ($r = 24$, $p < .05$). Additionally, caregiver PTSS severity was significantly and positively correlated with caregiver reports of children's PTSS ($r = 55$, $p < .001$) and depressive symptom severity ($r = .36$, $p < .001$), as well as with children's greater self-reported PTSS symptoms ($r = .40$, $p < .001$) (Oransky et al., 2013).

Child-reported CPSS symptoms were significantly lower post-intervention as compared with pre-intervention scores ($t(117) = 11.07$, $p < 001$) (Hahn et al., 2015). At baseline, we found a significant difference between child and caregiver ratings of child traumatic stress symptom severity, with children reporting higher levels of traumatic stress symptoms as compared to caregivers [$t(106) = 3.55$, $p < .01$]. We found no significant difference between child and caregiver ratings of child traumatic stress symptom severity post-intervention, indicative of an increase in concordance between caregiver and child reports of child symptoms (Hahn et al., 2015). Moreover, caregiver's baseline PTSD symptoms as assessed using the PCL-C (Weathers et al., 1994) were not associated with child's post-intervention symptom severity (Hahn et al., 2015). Consequently, this finding was contrary to some research which has found that caregiver stress at baseline is predictive of child symptom levels at the end of treatment (Eckshtain, Marchette, Schleider, Evans, & Weisz, 2018). We hypothesized that specific components of the CFTSI treatment might interrupt the process by which parental stress mediates a child's posttraumatic recovery (Epstein et al., 2017).

2. Method

2.1. Participants

Participants were 640 caregiver-child dyads referred for CFTSI treatment at a Child Advocacy Center following a recent potentially traumatic event or disclosure of physical or sexual abuse. Consistent with the CFTSI protocol for treatment eligibility, we considered participants eligible when either the child or the caregiver endorsed one or more symptoms on the Child Posttraumatic Symptom Scale following a recent potentially traumatic event or disclosure of physical or sexual abuse. The majority of child participants were ages 7–12 (66.7%) and ages 13–17 (24%); approximately 4% of child participants were under the age of 7 and age was unknown for 5% of child participants. Although CFTSI is intended for children ages 7 and older, younger children (4%) were included in this study, reflecting how CFTSI is implemented in the field. Child participants were 74% female ($N = 473$) and were 33% White, 27.9% Black, 10.9% Multiracial, 17.7% Other, 6% Native American/Alaska Native, 3% Asian; less than 1% identified as Native Hawaiian/Other Pacific Islander, and 6.8% were of Unknown ethnicity. Approximately half of the participants identified as Hispanic. Concerning trauma type, 83% of child participants were referred following sexual abuse, 13% were referred following physical abuse, and 4% were referred following other potentially traumatic events. Children reported experiencing an average of 6.65 (SD = 4.004) trauma types on a 23-item trauma history questionnaire that inquires about a wide range of event types including abuse and neglect, interpersonal violence, medical/unintentional injury and natural disaster. Caregivers reported that their children experienced an average of 5.46 (SD = 3.4) trauma types. Participating caregivers were 90% female and predominantly identified as the birth mother (79%). Other significant caregiver categories were: birth father (8%); grandmother (4%); aunt (2%); and adoptive mother (2%). All other categories were 1% or less. Only non-offending caregivers participate in CFTSI.

2.2. Site selection

CFTSI training protocol requires that all agencies be trained in "site teams" that include a minimum of one supervisor and two clinicians from each agency in order to promote sustainability of the treatment model. Site teams are formed when agencies first inquire about CFTSI training, and team members are then added iteratively if/when staff turnover occurs. Based on results from the RCT study (Berkowitz et al., 2011), we set power in the present study at 0.8 requiring a minimum of six sites with 25 or more completed CFTSI cases each. Also, we included sites in the present study based on having completed a minimum of 25 CFTSI cases at the time we extracted and froze the dataset (November 2016). Ten sites met or surpassed this threshold and are included in this study. The 10 sites are all Child Advocacy Centers (CACs) offering multidisciplinary services for children and families affected by sexual or physical abuse. CACs unite law enforcement, prosecutorial, medical, child protection and mental health professionals to provide coordinated, comprehensive responses to maltreatment victims and their non-abusing caregivers. CACs in the present study are located in rural (N = 1) and urban (N = 9) communities along the Eastern Seaboard of the United States. Over the 31 months of data collection, sites contributed for an average of 25 months (SD = 6.06) A total of 79 clinicians contributed to the data set. Team sizes ranged from three to 18 clinicians (M = 8, SD = 5.36). Clinicians contributed an average of 8 cases (SD = 3.15, range 1-60). Accordingly, sites varied widely concerning numbers of children receiving services annually, as well as numbers of caregiver-child dyads receiving CFTSI treatment annually. All sites participated in the standard CFTSI training protocol that includes: (a) attending a 2-day, in-person training; (b) participating in a minimum of nine out of 12 one-hour consultation calls within approximately six months following the initial training; (c) satisfactorily completing a minimum of three cases during the consultation period; and (d) collecting and submitting clinical and continuous quality improvement (CQI) data using the CFTSI data system.

2.3. Data collection

Procedures. CFTSI includes standardized assessments as an integral part of the clinical intervention. As such, the CFTSI protocol automatically yields data about the implementation and treatment outcomes that can be utilized for both quality assurance and evaluation purposes. A data system supporting these functions was purpose-built for the CFTSI project in 2014 using the REDCap platform, a secure, non-profit, web-based application designed to support research data collection (Harris et al., 2009). As a fundamental part of the CFTSI training process, each site team is registered in the CFTSI data system, and each new CFTSI clinician is registered as a user of the data system affiliated with their site. Furthermore, the data system provides CFTSI sites with on-going quality assurance metrics and evaluation data at the site level and provides investigators with a platform for learning about how CFTSI is being implemented within and across diverse real-world settings and with different populations. During the 2-day, in-person training on the clinical model, all new clinicians are taught CFTSI inclusion/exclusion criteria, clinical starting and ending points and the use of the standardized assessment tools that form an integral part of the CFTSI treatment. (For a complete description of the CFTSI model, including a description of all assessments and sessions, please refer to Epstein et al. (2017)). Following the in-person training, a 1-hour virtual training prepares clinicians to access and utilize the data system. Thereafter, clinicians begin to provide CFTSI to clients, completing the standardized assessment tools with clients as part of the CFTSI treatment protocol and entering a limited data set with no protected health information into the data system in real time throughout treatment. Beginning with their first CFTSI case, clinicians entered cases into the data system. As a result, a cumulative series of trainee-supervision and clinician-feedback/site-quality assurance datasets continue to build as the model is implemented in diverse community settings. We included all completed CFTSI cases at each of 10 CAC sites between April 2014 and November 2016 in these analyses. Hereafter, we defined case completion as both caregiver and child having completed the pre- and post measures in the CFTSI protocol. We did not apply post hoc inclusion/exclusion criteria at the time of analysis. Furthermore, the Institutional Review Board at Yale University reviewed and approved all procedures involved with the study.

2.4. Measures

We measured child PTSS using the 17 items on Part 1 of the Child PTSD Symptom Scale (CPSS) (Foa et al., 2001) that assesses a child's symptom severity. Each of the 17 items reflects a specific DSM-IV PTSD symptom. Respondents were asked to rate symptoms on a Likert scale ranging from 0 (*not at all*) to 3 (*5 or more times a week*), and total scores were calculated. Individuals are asked to consider the last two weeks when responding to the items. Foa et al. (2001) demonstrated high internal consistency (α = .89, n = 75), and found high convergent validity with another validated measure of child PTSD symptoms. CFTSI clinicians are trained to administer the CPSS with the child and with the caregiver separately, to obtain independent reports of the child's symptoms. Pre- and post-Cronbach's alphas for the 17 items as reported by the caregiver were .87 and .87, respectively. Cronbach's alphas for the 17 items as reported by the child were .83 and .83, respectively.

We measured caregiver PTSS using the Posttraumatic Checklist–Civilian version (PCL-C) (Weathers et al., 1994), a 17-item questionnaire that anchors items to "stressful experiences." We asked respondents to rate on a Likert [1–5] scale the degree to which they were bothered by symptoms since the event. Thereafter, we grouped items corresponding to DSM-IV PTSD symptoms into clusters: five re-experiencing symptoms, seven numbing/avoidance symptoms, and five hyper-arousal symptoms. The PCL-C has high internal consistency (α = .94, n = 471) and retest reliability (Conybeare, Behar, Solomon, Newman, & Borkovec, 2012). It is well correlated with other self-report PTSD measures as well as benchmark diagnostic interviews, such as the Clinician Administered PTSD Scale (CAPS) (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Although the PCL-C is typically self-administered, in the CFTSI protocol, the pre-intervention PCL-C is administered as a clinical interview during Session 1 (the first clinical meeting with the

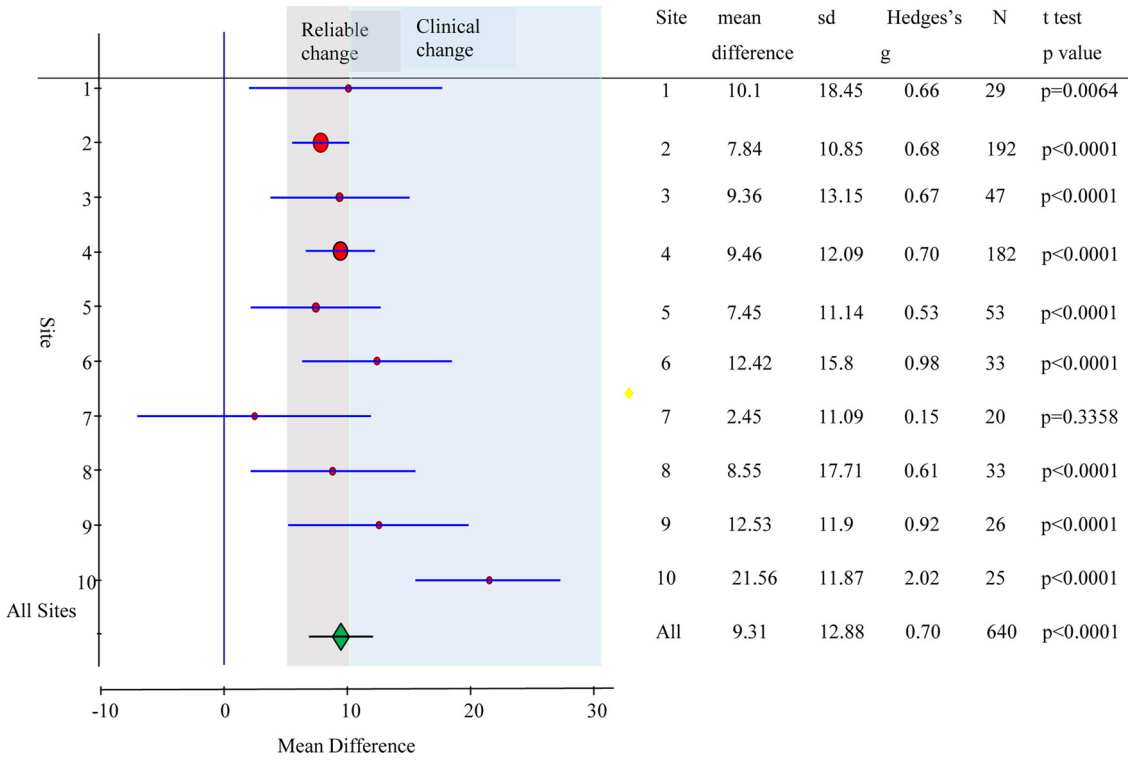

Fig. 1. Forest plot of mean pre-post treatment caregiver PCL-C scores and Hedge's g effect sizes.

caregiver alone), as well as again at the post-CFTSI caregiver evaluation. Pre- and post-Cronbach's alphas for the 17 items were .90 and .91, respectively.

2.5. Effect size calculations

We utilized Hedge's g to determine the intervention's effect sizes. Hedge's g is recommended over Cohen's d when the sample sizes are small or if the sample sizes vary across groups. We calculated Hedge's g effect sizes for the paired data by taking the mean difference in the change scores (Xdiff) divided by the pooled weighed standard deviation (Sdiff) of the pre/post differences (Xdiff/Sdiff). An online calculator developed in the Quantitative Research, Evaluation & Measurement (QREM) program within the Educational Studies department at Ohio State University calculated the Hedge's g effect sizes. The mathematical formulas, calculator and supporting citations can be found at https://effect-size-calculator.herokuapp.com/. Additionally, SAS V9.4 computed the descriptive statistics, paired t-tests of the mean differences in the overall sample and across the 10 sites.

3. Results

3.1. Caregiver PCL-C scores

Fig. 1 is a forest plot of the paired, pre-post treatment mean differences for caregiver PCL-C scores. The light gray-shaded section of the figure represents a statistically reliable degree of change (≥5), and the dark gray shaded area corresponds to a clinically meaningful change (≥10) based on norms for the PCL-C (National Center for PTSD, 2012). The attached table within the figure provides the overall Hedge's g effect size and by site. The mean PCL-C change across the 10 CAC sites (M = 9.31, SD = 12.9, N = 640, p < 0.0001) is close to a clinically meaningful change (≥10) in caregiver PTS. Inspection of the figure shows that a substantial

Table 1
Percent of caregivers paired PCL-Cs above and below PTSD threshold (≥ 30) pre- and post-CFTSI (N = 640).

PTSD status on the PCL-C pre and post- treatment	Frequency	Percent
Below–below	241	37.7%
Below–above	19	3.0%
Above–below	237	37.0%
Above–above	143	22.3%

Table 2
Child-rated, pre- post-PTSD symptoms on the CPSS.

	Paired differences				
Site	Mean	SD	Hedge's *g*	*N*	t test *p* value
1	9.69	7.89	1.23	29	< 0.0001
2	11.35	8.87	1.47	192	< 0.0001
3	9.40	10.73	0.87	47	< 0.0001
4	9.42	11.36	0.93	182	< 0.0001
5	8.96	9.55	1.06	53	< 0.0001
6	9.93	7.94	0.99	33	< 0.0001
7	11.05	6.74	1.63	20	< 0.0001
8	10.97	10.39	1.20	33	< 0.0001
9	14.84	11.75	1.36	26	< 0.0001
10	18.16	8.79	2.50	25	< 0.0001
All sites	10.70	10.03	1.17	640	< 0.0001

number of caregivers experienced clinically meaningful reductions in their PTS throughout CFTSI.

Table 1 illustrates that about a third (37%) of all caregivers were below the PCL-C cut-off for PTSD (≥30) both at the beginning and end of CFTSI. Approximately one quarter (22%) of all caregivers were above the PCL-C cut-off for PTSD at both points. Three percent of all caregivers reported non-clinical, pre-intervention PCL-C scores and subsequently reported PCL-C scores that exceeded the clinical threshold for PTSD post-intervention. Almost two thirds (62%) of caregivers with PTSD level pre-intervention PCL-C scores, however, decreased to subclinical level following CFTSI.

3.2. Child rated clinical improvement

Table 2 gives the pooled effect size of the mean, pre-post, paired differences in Child-Rated CPSS score ($g = 1.17$, $N = 640$, $p < 0.0001$) and site-specific effect sizes. All effect sizes are in the strong to very strong range *(g = 0.86–2.50)*. By and large, the children reported sizable drops in their PTSD symptoms on self-ratings. Fig. 2 shows the pre- and post-, self-rated CPSS scores for items 1–17 by site.

3.3. Caregiver-rated child improvement

The pooled ES for the mean, paired, pre-post differences in caregiver-rated child's CPSS score (g = 0.66, N = 640, p < 0.0001) and site-specific ESs are shown in Table 3. ES ranges from weak *(g= 0.18)* to very strong *(g = 1.68)*. Fig. 3 shows the pre- and post-, caregiver-rated CPSS scores for items 1–17 by site. Caregivers showed much greater heterogeneity of outcome effect sizes in their

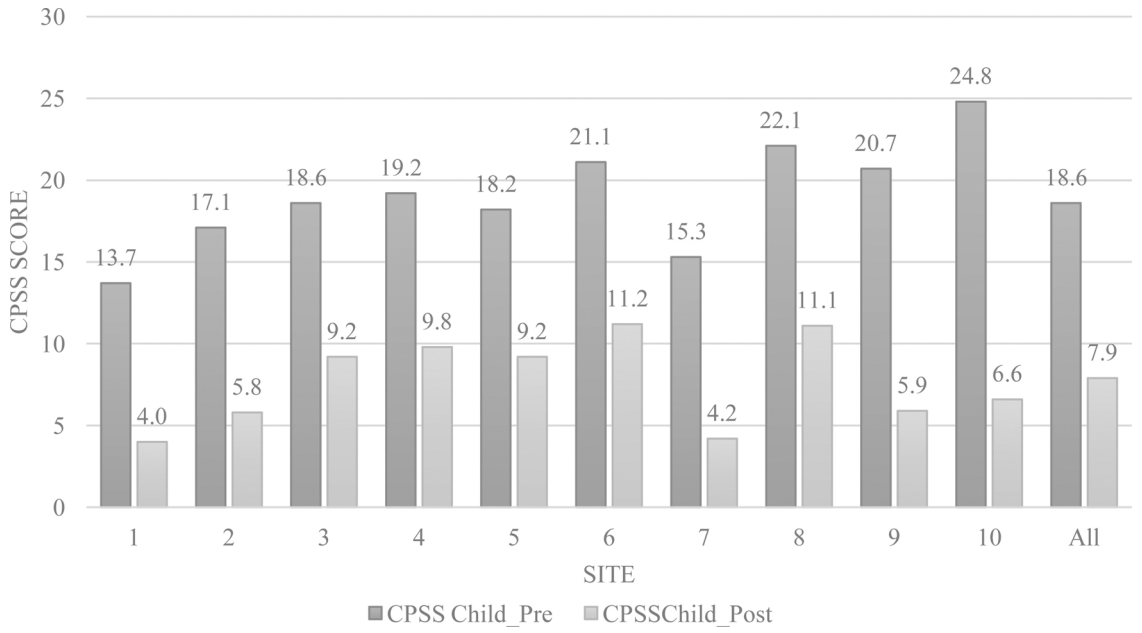

Fig. 2. Child's self-rated pre-post PTSD symptoms by site.

Table 3
Caregiver-rated, pre-post child PTSD symptoms on the CPSS.

	Paired differences				
Site	Mean	SD	Hedge's *g*	*N*	t test *p* value
1	4.20	6.12	0.78	29	0.0009
2	5.87	7.64	0.81	192	< 0.0001
3	1.70	9.51	0.18	47	0.23
4	5.23	9.40	0.52	182	< 0.0001
5	4.89	9.97	0.59	53	0.0008
6	6.93	7.34	0.71	33	< 0.0001
7	11.35	7.44	1.68	20	< 0.0001
8	3.57	11.75	0.39	33	0.09
9	10.38	7.94	1.41	26	< 0.0001
10	11.08	8.98	1.27	25	< 0.0001
All sites	5.72	8.96	0.66	640	< 0.0001

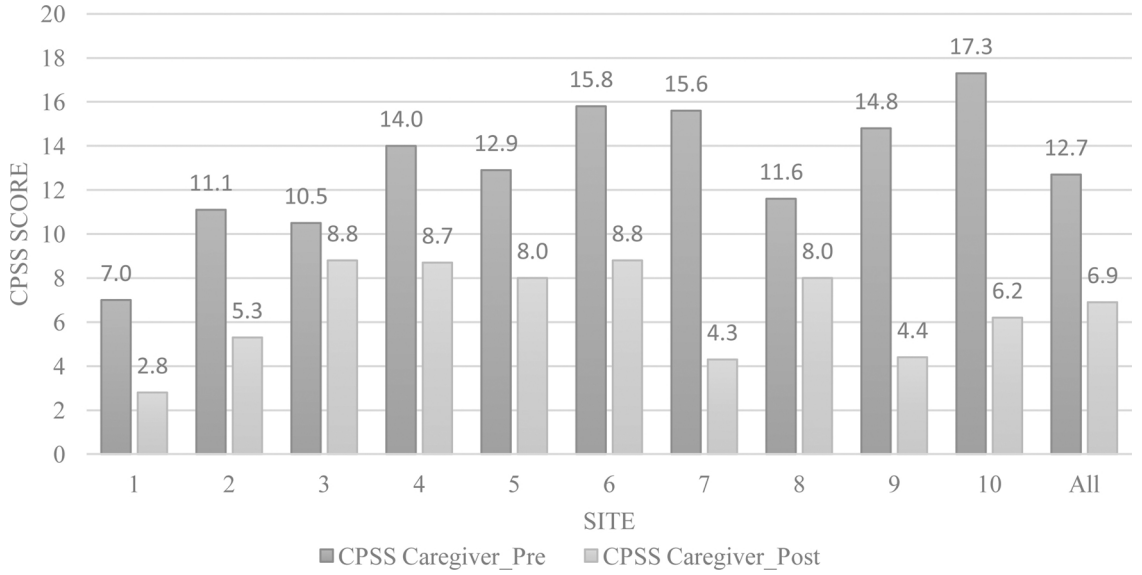

Fig. 3. Caregiver-rated child pre-post PTSD symptoms by site.

evaluations of their child's PTSD symptoms than the children. The correlation between the caregiver's pre-post PCL change score and their pre-post ratings of their child's CPSS scores, although statistically significant, was low ($r_{(640)} = 0.15$, $p < .0001$).

4. Discussion

4.1. Parental posttraumatic stress symptoms

More than half (59%) of caregivers in the study exceeded the PCL-C threshold for PTSD at the time that CFTSI treatment started. CFTSI was associated with clinically meaningful reductions in PTS symptoms in 62% of those caregivers. The overall mean PCL-C change (9.31, SD = 12.9) in paired, pre-post PCL-C scores is close to a clinically meaningful change of 10 or greater. Moreover, there was a robust moderate pooled effect size ($g = 0.70$, $N = 640$, $p < 0.0001$) across the 10 sites. The only site (7) with a non-significant effect size was an outlier in that it was underpowered (we discovered the sample size error after the dataset was frozen).

Thus, in over 60% of CAC cases, a participating caregiver (usually a mother) presenting with clinical level PTSD at the start of her child's treatment, as measured on the pre-treatment PCL-C, no longer met criteria for their own PTSD following the end of her child's CFTSI treatment. About 7% (19 cases) of all caregivers who did not have PTSD at the start of their child's treatment, however, exceeded the PCL-C threshold for PTSD following CFTSI. These emerging PTSD cases were distributed across nine of the 10 sites. There does not appear to be a single explanation for the new cases. The increase in PTSD symptoms in even this small proportion of caregivers warrants further investigation. However, one possible explanation for the increase in reported symptoms of PTSD among a small group of participating caregivers is their increased capacity for symptom reporting by the end of treatment. In fact, for some caregivers, their child's trauma treatment may be the first time that clinical attention has been paid to the caregiver's own behavioral health status. CFTSI offers a structure for the identification of posttraumatic symptoms, which can serve the caregiver as well as the child, allowing caregivers the opportunity to recognize their own current reactions to the precipitating events, as well as longer-

standing symptoms in the context of their personal histories. Additionally, the psychoeducation about trauma which CFTSI offers may help caregivers to build self-observing capacity, thus increasing their ability to observe and identify their symptoms. In addition, participating in CFTSI may help caregivers become acclimated to, and more comfortable with, talking about trauma and trauma symptoms, which may, in turn, decrease familiar patterns of avoidance. Consequently, the combination of increased knowledge about trauma symptoms, increased self-observational capacity, and decreased trauma avoidance may result in increased reporting of trauma symptoms when caregivers report on their symptoms during the post-CFTSI assessment.

It may also be true that among a small proportion of caregivers there is, indeed, an increase in PTS symptoms during their child's CFTSI treatment. Findings in the present study are similar to those of a study of caregivers participating in their child's TF-CBT treatment, which also found that a small percentage (6%) of parents experienced an increase in symptoms at the end of treatment (Tutus et al., 2017). Notwithstanding, the increase in symptoms among the small group of caregivers in this study may be in response to their greater awareness about the extent of their child's trauma or as a result of being reminded of their own recent or past traumatic experiences. Alternatively, as the child's symptomatology decreases and the traumatic disruption of daily life subsides, the caregiver may have more opportunity to focus on their own posttraumatic experience. Moreover, there is likely a subset of caregivers who are experiencing an exacerbation or persistence of the long-term sequelae of their previous traumatization. While caregivers may reveal these phenomena and associated underlying personality vulnerabilities in the course of a brief treatment, they cannot likely be remediated during 5–8 treatment sessions that primarily focus on the child's recovery. While it is essential to explore further and understand the reasons for the increase in symptoms experienced by the small subset of caregivers, it is equally important to recognize that CFTSI fulfills an important function of early intervention for adults as well as for children, demonstrating sensitivity in identifying those who may require longer-term self-focused treatment. This latter goal underscores an essential ingredient of the CFTSI protocol that requires clinicians to re-evaluate both the caregiver and child at the end of treatment and refer for additional mental health services as necessary.

Improvement in caregiver posttraumatic symptoms is an important secondary outcome of CFTS. This improvement may be explained in part by the caregiver's adoption of self-regulatory strategies. Additionally, the caregiver's greater sense of mastery over their own traumatic dysregulation may be further supported as they are able to recognize the role that they have played in supporting the child's recovery. When they observe their contributions to improvements in parent-child communication and reduction in child symptoms, caregivers may re-establish a sense of agency in their role as parent that symptoms had previously undermined. Given the well-established links between caregiver PTS and multiple adverse outcomes for children, it is clear that in addition to the direct benefit that children experience from CFTSI in the reduction of their own PTS symptoms, lowering parental PTS symptoms can make a critical contribution to the immediate and longer-term health of the child. Research to further understand the mechanisms of action by which caregiver PTS symptoms are reduced is warranted.

Research on the impact of parental PTSD on children suggests that, like maternal depression, there is a differential gender impact with males being more affected than females (Hagan et al., 2017). Most studies, however, have primarily or exclusively examined maternal PTSD and child outcomes. In this study, the vast majority of participating caregivers were also female (90%), limiting our ability to consider caregiver gender as a dependent variable. However, given the large number of male combat veterans, male law enforcement officers, and male first responders who are at risk for PTSD, and the fact that relatively little is currently known about the impact of paternal PTSD on children, this is an important question. As cases continue to accumulate in the CFTSI data system, this is an area for future research.

Based on earlier RCT results, we set power in this study at 0.8 requiring a minimum of six sites with 25 or more cases. In Fig. 1 (Forest Plot), note that site 7 is underpowered ($n = 20$). Unfortunately, we discovered this after the data set was frozen. The site 7 effect size is further skewed by a single outlier whose post-CFTSI PCL-C score almost doubled (although the caregiver's pre-intervention PCL-C score exceeded the PTSD clinical threshold).

4.2. Multi-site meta-analytical approach

Although the primary purpose of the present study was to examine the impact of participating in a brief evidence-based child trauma treatment model on caregivers' traumatic stress symptoms, the study also serves as a proof-of-concept for the multi-site meta-analysis (MSMA) approach to evaluating the effectiveness of an intervention delivered across multiple settings. While RCTs are the gold standard of treatment efficacy research in medicine and behavioral health, they can also be expensive, logistically complicated, and labor-intensive to conduct; additionally, the capacity of the RCT methodology to evaluate effectiveness under "real world" conditions can be limited (Deaton & Cartwright, 2018). For interventions such as CFTSI, which have established an evidence base through one or more RCT, feasible and cost-effective strategies for the evaluation of therapeutic effectiveness are critical when interventions are disseminated across a range of real-world clinical settings. The MSMA approach taken in this study is one such strategy.

MSMA meets the criteria necessary to qualify as a robust meta-analysis. In many instances (especially in literature review-based meta-analyses), different outcome statistics used by the individual studies are converted to a "common denominator" allowing for the calculation of a pooled effect size. Thus, a strength of the MSMA approach taken in this study is utilization of data collected prospectively to directly calculate effect size rather than an indirect process by which summary statistics are converted to effect sizes. CFTSI uses common measures and clinical criteria across sites. Moreover, the delivered intervention is equivalent in scope, duration, and clinical starting and end points at all sites. The prospective data collection and CQI function integral to the data system increase adherence to model fidelity, thereby improving internal validity. Real-world diversity of provider sites and the populations they serve increases the external validity and therefore the generalizability of the results.

The recent availability of non-commercial, web-based data management systems, such as Research Electronic Data Capture (REDCap), make the collection of multi-site, clinical data feasible. Moreover, web-based systems can be used to collect clinical outcome datasets that typically include demographics, trauma histories, treatment course, and pre-post outcome measures, simplifying data management, allowing for the standardization of data entry, and reducing site-unique coding errors (Harris et al., 2009). At present, most of these datasets are collected under the HIPAA clinical quality assurance provisions (Ammerman, Putnam, Margolis, & Van Ginkel, 2009). The CFTSI data system was designed to serve dual goals of quality assurance in implementation and outcome evaluation. In fact, the system offers CFTSI sites and individual users essential benefits that support ongoing and consistent use. The result is that providers continue use of the data system, and investigators have access to relatively large data sets that grow as the intervention model is provided at established sites and disseminated to new sites. Consequently, the minimum number of cases contributed by a site can be set *a priori* to achieve the desired degree of statistical power.

There are some significant limitations to the multi-site meta-analytic strategy. Unlike a randomized controlled trial, MSMA cannot establish whether a given intervention is more efficacious than the passage of time or other interventions. Furthermore, it does not allow for a rigorous "intent to treat" analysis, although MSMA can be utilized to compare drop-outs with intervention completers on baseline measures as well as to examine "dose" concerning the number of completed sessions. Some sites could, however, conduct follow-up evaluations with participants, if resources permitted. As an evaluation methodology, MSMA is most suitable for use with interventions that have previously met some minimum criteria as "evidence-based" and are now being disseminated across multiple clinical settings.

In instances in which data consist primarily or exclusively of trainee cases, an MSMA may underestimate the effectiveness of an intervention as delivered by experienced practitioners. Interventions also evolve with repeated dissemination in response to clinical experience, dissemination pressures, resource limitations, and feedback from diverse sites or special populations. Equally important, MSMAs may be most informative when conducted at several time points or with different cohorts to determine if an intervention is evolving or is differentially efficacious in specific settings or with unique populations.

5. Conclusion

The current findings are consistent with the prior RCT indicating significant reductions in child PTS symptoms following CFTSI. Moreover, the current findings indicate that CFTSI reduces PTS symptoms for many participating caregivers. The interest and enthusiasm that CFTSI has generated among agency leaders and mental health professionals serving children and their caregivers following traumatic events have been significant, as evidenced by the continuous and growing demand for training in the clinical model. While additional large-scale randomized trials would be invaluable to answer specific questions about the intervention, MSMA offers a feasible and cost-effective methodological complement to RCTs for the evaluation of therapeutic effectiveness in treatment models disseminated across a range of real-world clinical settings.

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