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Traumatic and stressful events in early childhood: Can treatment help those at highest risk?☆

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ABSTRACT

Objective: This study involves a reanalysis of data from a randomized controlled trial to examine whether child–parent psychotherapy (CPP), an empirically based treatment focusing on the parent–child relationship as the vehicle for child improvement, is efficacious for children who experienced multiple traumatic and stressful life events (TSEs).
Methods: Participants comprised 75 preschool-aged children and their mothers referred to treatment following the child's exposure to domestic violence. Dyads were randomly assigned to CPP or to a comparison group that received monthly case management plus referrals to community services and were assessed at intake, posttest, and 6-month follow-up. Treatment effectiveness was examined by level of child TSE risk exposure (<4 risks versus 4+ TSEs).
Results: For children in the 4+ risk group, those who received CPP showed significantly greater improvements in PTSD and depression symptoms, PTSD diagnosis, number of co-occurring diagnoses, and behavior problems compared to those in the comparison group. CPP children with <4 risks showed greater improvements in symptoms of PTSD than those in the comparison group. Mothers of children with 4+ TSEs in the CPP group showed greater reductions in symptoms of PTSD and depression than those randomized to the comparison condition. Analyses of 6-month follow-up data suggest improvements were maintained for the high risk group.
Conclusions: The data provide evidence that CPP is effective in improving outcomes for children who experienced four or more TSEs and had positive effects for their mothers as well.
Practice implications: Numerous studies show that exposure to childhood trauma and adversity has negative consequences for later physical and mental health, but few interventions have been specifically evaluated to determine their effectiveness for children who experienced multiple TSEs. The findings suggest that including the parent as an integral participant in the child's treatment may be particularly effective in the treatment of young children exposed to multiple risks.

Introduction

A large body of research shows that the experience in childhood of multiple traumatic and stressful events (TSEs) is linked to dysfunction both in childhood and later in life. Cumulative childhood TSEs have been linked to childhood behavior

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problems (Deater-Deckard, Dodge, Bates, & Pettit, 1998; Greenberg, Speltz, DeKlyen, & Jones, 2001), psychiatric diagnoses (Rutter, 1979), impaired cognitive functioning (Liaw & Brooks-Gunn, 1994; Sameroff, Seifer, Baldwin, & Baldwin, 1993), worse academic trajectories (Gutman, Sameroff, & Cole, 2003), and greater allostatic load (Evans, 2003). The Adverse Childhood Experiences study (ACE; acestudy.org) examined the cumulative impact of nine TSEs related to child maltreatment and impaired household environments and found associations with adult physical health risks (Dube, Felitti, Dong, Giles, & Anda, 2003) and with the leading causes of adult death and disability (Felitti et al., 1998).

While some researchers highlight the importance of understanding links between specific categories of risk and functioning (e.g., Deater-Deckard et al., 1998), others have found that functioning is best predicted by cumulative risk rather than specific risks or risk patterns (e.g., Greenberg et al., 2001; Morales & Guerra, 2006; Sameroff et al., 1993; Sameroff, Seifer, & McDonough, 2004). There is substantial research evidence that experiencing 4 or more TSEs poses particularly high risk for dysfunction. In the classic Isle of Wight study, Rutter (1979) reported that children with 4 or more TSEs had a 10-fold increase in incidence of psychiatric disorders compared to those with 0 or 1 such risk factors. Yumoto, Jacobson, and Jacobson (2008) identified 4 or more risks as a threshold for poorer cognitive and behavioral outcomes among children not prenatally exposed to drugs or alcohol, with teachers reporting higher levels of delinquent behavior for children with four versus 3 risks. Data from the Kauai Longitudinal Study show that children with 4 or more risks at age 2 were more likely to have learning and behavior problems by age 10 as well as delinquency records, mental health problems, and teenage pregnancies by age 18 (Werner, 1996). In the ACE study, adults who experienced 4 or more childhood TSEs showed a 12-fold increase in risk for alcoholism, drug abuse, depression, and suicide, and were more likely to be at risk for poor self-rated health, ischemic heart disease, cancer, stroke, and diabetes (Dube et al., 2003; Felitti et al., 1998).

The public policy implications of these findings call for effective interventions for those at highest risk. Although much of the TSE literature involves older children and adults, it is essential to develop and evaluate early childhood interventions because of the evidence that children in the birth-five age range are at disproportional high risk for interpersonal TSEs. Police reports show that children under age 5 are more likely to be exposed to domestic violence (Fantuzzo & Fusco, 2007), and children aged birth to 3 have the highest rates of morbidity and mortality due to physical abuse (US Department of Health and Human Services, 2007). Cumulative TSE exposure in early childhood is also associated with greater problems in functioning. In a pediatric sample of 305 children aged 2–5 years, 42% of the 2-year-old, and 52.5% of the entire sample had experienced at least 1 severe traumatic stressor, and there was a strong association between the number of traumatic events and the likelihood of a DSM-IV emotional or behavioral disorder, which was documented in 17.4% of the children (Egger & Angold, 2004).

The first 5 years of life represent a key period for brain growth, maturation of the stress response system, development of affect regulation strategies, and formation of basic relationship schemas (Courchesne et al., 2000; Shonkoff & Phillips, 2000; Watamura, Donzella, Kertes, & Gunnar, 2004). Exposure to TSEs in early childhood may have enduring consequences for the child's developmental trajectory given their impact on these areas of development, and it is of utmost important to create effective early treatments to prevent enduring patterns of maladaptive functioning. It is also critical to develop and evaluate interventions for ethnic minorities. Minority and low SES children are at greater risk for multiple TSEs because these children are disproportionately exposed to violence in their homes and communities (Lynch, 2006; US Department of Justice, 1998). In addition, disparities in access to services mean that the minority populations in greatest need are the least likely to receive the treatment they need (President's New Freedom Commission on Mental Health, 2003).

The present study is based on the premise that relationship-based clinical interventions in early childhood hold great promise for addressing these issues because young children's primary relationships are robust predictors of functioning in a variety of domains (Belsky & Fearon, 2002; Cicchetti & Toth, 2000; Ghosh Ippen & Lieberman, 2008; Sroufe, Egeland, Carlson, & Collins, 2005; Zeanah & Zeanah, 2009). Child Parent Psychotherapy (CCP) (Lieberman, Van Horn, & Ghosh Ippen, 2005; Lieberman and Van Horn, 2008) is an empirically supported treatment where the child and the primary caregiver participate jointly in the sessions, with the therapeutic goal of enhancing the parent's capacity to provide safety and developmentally appropriate caregiving to the child. Originating in Fraiberg's infant–parent psychotherapy (Fraiberg, 1980) and attachment theory (Bowlby, 1969/1982), CPP has been extended to the treatment of children in the birth-5 age range exposed to violence and other traumatic stressors. Data from 5 randomized trials support CPP efficacy with a variety of samples, including anxiously attached Latino toddlers (Lieberman et al., 1991); maltreated infants (Cicchetti, Rogosch, & Toth, 2006); toddlers of depressed mothers (Cicchetti, Toth, & Rogosch, 1999; Toth, Rogosch, Cicchetti, & Manly, 2006); maltreated preschoolers (Toth, Maughan, Manly, Spagnola, & Cicchetti, 2002); and preschoolers exposed to domestic violence (Lieberman et al., 2005; Lieberman, Ghosh Ippen, & Van Horn, 2006). Children treated with CPP show higher resilience than the control groups as measured by secure attachment, better performance in cognitive tests, fewer symptoms of traumatic stress and behavioral problems, and reduced prevalence of PTSD (see Lieberman & Van Horn, 2008 for a review). In addition, the data suggest that mothers who participate in CPP show greater reductions in PTSD avoidance symptoms and improvements in global symptoms (Lieberman et al., 2005, 2006).

This study utilizes a reanalysis of data from the Lieberman et al. (2005, 2006) treatment outcome and follow-up studies to investigate whether CPP is efficacious with preschoolers exposed to multiple TSEs. We hypothesize that, relative to a comparison group, participation in CPP will result in greater symptom reduction for children who experienced four or more TSEs. We expect it to continue to be efficacious for those with fewer than four TSEs. In addition, given prior research suggesting that treatment results in benefits for mothers, we explore whether the level of child risk influences treatment effects on maternal symptoms.

Method

Participants

Participants were 39 girls and 36 boys aged 3–5 (M = 4.06, SD = .82) and their mothers. Dyads were referred to treatment by pediatric providers, family resource programs, childcare providers, and child protection workers because there were clinical concerns about the child's behavior. Child–mother dyads were recruited if the child was 3–5 years old, had been exposed to marital violence as confirmed by mother's report on the Conflict Tactics Scale 2 (Straus, Hamby, Boney-McCoy, & Sugarman, 1996), and the father figure perpetrating marital violence no longer resided in the home. Exclusionary criteria for the mothers were documented abuse of the target child, current substance abuse and homelessness, mental retardation, and psychosis. Children with mental retardation or autistic spectrum disorder were also excluded. The sample was ethnically diverse. The majority of the children (38.7%) were of mixed ethnicity (predominantly Latino/White) and the rest were 28% Latino, 14.7% African American, 9.3% White, 6.7% Asian, and 2.6% other. Mothers averaged 31.48 years of age (SD = 6.23) and 12.51 years of education (SD = 3.99). Monthly income was $417–$8,333 (M = $1,817; SD = 1,460.44). Additional details regarding the sample can be found in Lieberman et al. (2005).

Procedures

At intake, all dyads completed a 4-session assessment consisting of informed consent procedures, clinical interviews, structured and semi-structured assessment instruments, and videotaped mother–child interaction. All procedures received University of California-San Francisco institutional review board (IRB) approval. Dyads were randomly assigned to CPP or to a comparison group that received monthly case management plus referrals to community individual treatment for mother and/or child. Dyads were assessed again at posttest (1 year after randomization). At follow-up, 6 months after the posttest assessment, mothers completed the Child Behavior Checklist and Symptom Checklist-90, described below, to assess whether treatment gains were maintained.

Measures

Traumatic and stressful events (TSEs). Total child TSEs were calculated by summing across 8 categories that correspond with ACEs (acestudy.org), selected to enable comparisons with the growing literature on these risks. Data sources included coded family history interviews, DHS reports, diagnostic interviews with mothers, and the Screening Survey of Children's Exposure to Community Violence: Parent Report Version, a 51-item questionnaire that assesses children's exposure to a range of stressful and traumatic events (Richters & Martinez, 1993). Due to study inclusion criteria specifying that the father figure perpetrating marital violence no longer resides in the home, all children had experienced a significant separation from their biological father. While all children were referred due to DV exposure, this TSE was coded only if reports indicated that the child had witnessed at least 1 DV event. Based on the literature (Dube et al., 2003; Felitti et al., 1998; Werner, 1996; Yumoto et al., 2008), we dichotomized risk status: children with 4 or more TSEs were assigned to the high risk group; children with fewer than 4 TSE's were assigned to the low risk group.

Semistructured interview for diagnostic classification DC: 0–3 for clinicians (Scheeringa, Zeanah, Drell, & Larrieu, 1995; DC: 0–3 interview). This clinician-administered caregiver interview assesses diagnoses and symptoms in the Diagnostic Classification Manual for Mental Health and Developmental Disorders of Infancy and Early Childhood (Zero to Three: National Center for Clinical Infant Programs, 1994; DC: 0–3). It was used to gather information regarding the number of Post Traumatic Stress Disorder (PTSD) and depression symptoms the child was experiencing, diagnosis of PTSD, and to code the number of DC: 0–3 diagnoses other than PTSD that the child met criteria for, including depression, anxiety, and sleep disorder (co-occurring diagnoses). Kuder-Richardson 20, a measure of internal consistency for dichotomous variables was .77 for PTSD and .69 for depression. Trained interviewers administered and scored the DC: 0–3 interview. Assessors then met with a supervisor and the assessment team, reviewed the interviews, and reconciled any differences in scoring.

Child Behavior Checklist (CBCL 2/3 and 4/18). This instrument includes versions for 2- to 3- and 4- to 18-year-old (Achenbach, 1991, 1992) that have been shown to be valid for use in cross-cultural samples and to have good reliability, stability and predictive validity. The Total Behavior Problems score was used as a measure of global child functioning.

Clinician-administered PTSD Scale (CAPS). The interview has excellent test–retest reliability and convergent validity (Keane et al., 1989; Weathers & Litz, 1994) and was administered to measure maternal PTSD. The measure yields a total PTSD score as well as a diagnosis of PTSD based on DSM-IV criteria. Trained interviewers administered and scored the CAPS. Assessors then met with a supervisor and the assessment team, reviewed the interviews, and reconciled any differences in scoring.

Symptoms Checklist-90 Revised (SCL-90-R). This 90-item checklist measures current psychiatric symptoms through three summary indices and nine primary dimensions, with α ranging from .77 to .90, and test–retest reliabilities from .78 to .90 (Derogatis, 1994). The depression scale was used to assess maternal functioning.

Treatment

CPP. Weekly CPP sessions lasted approximately 60 m and were conducted over the course of 50 weeks, with dyads attending a mean of 32.09 CPP sessions (SD = 15.20). The clinicians had at least a Master's degree in clinical psychology. Treatment fidelity was monitored through weekly case supervision that included review of process notes. The treatment manual has been published (Lieberman & Van Horn, 2005), and the theoretical, clinical, and research elements of the treatment have been further elaborated in Lieberman and Van Horn (2008).

Individual psychotherapy plus case management. After randomization, comparison group mothers received assessment feedback, were introduced to a Ph.D. degree-level clinician for case management, received information about mental health clinics, and were connected to the clinic of their choice. They received at least monthly phone calls from their case manager and could contact her as needed. The clinical case manager assisted in securing needed services, inquired about how mother and child were doing, asked about life changes, and intervened during crises. These calls generally lasted 30 m. Face-to-face meetings were scheduled when clinically indicated. In the comparison group, 73% of mothers and 55% of children received individual treatment. Additional details regarding treatment attendance are provided in Lieberman et al. (2005).

Data analysis

Descriptive statistics were used to examine the prevalence of TSEs. General linear model (GLM) repeated-measures analyses were conducted to investigate treatment effects by level of child TSE exposure. Analyses were conducted for each dependent variable with treatment (CPP versus comparison) and child TSE status (dichotomized as <4 versus 4+) as between-subject variables and time (intake versus posttreatment and intake versus 6-month follow-up) as the within-subject variable. Analyses were conducted using separate repeated measures models (intake versus posttreatment and intake versus 6-month follow-up) rather than a single model with 3 time points. This approach was used because although the CBCL and SCL-90-R were collected at 3 time points, the clinical interviews of child and maternal PTSD were conducted only at intake and posttest due to financial constraints. This analysis strategy allowed for consistency of analyses across measures, streamlining of data presentation, and decreased post hoc testing. Partial eta-squared, η_p^2, which can be understood as the proportion of variability attributable to the factor or interaction, is provided as a measure of effect size for GLM main effects and interactions. Analyses were conducted first using the intent-to-treat (ITT) sample because this approach presents the most unbiased analysis. ITT analyses were conducted using a conservative last observation carried forward (LOCF) method, in which the score at the most recent time period was substituted for later incomplete data. While this method of data imputation is commonly used, easy to understand, and allows for consistency and comparison with our prior RCT, it has statistical limitations along with other methods of data imputation (EMEA, 2009). For this reason, following recommendations of other researchers (e.g., Altman, 2009), analyses were repeated with the treatment completer (TC) sample (those who completed participation in the intervention or comparison condition), with list-wise deletion of cases with missing data to allow for examination of the consistency of results across ITT and TC samples.

Significant timetreatment and time × treatment × TSE status interactions indicate the presence of treatment effects. Due to the possibility that small sample size may limit the power necessary to detect significant treatment effects, both significant treatment effects and trends in either ITT or TC samples were examined through post-hoc analyses (*t*-tests) to determine whether significant change occurred for subgroups (CPP <4, CPP +4, comparison <4, comparison 4+). Given the small sample size, we did not apply a correction for multiple comparisons because doing so would increase the risk of Type II error, and focused instead on effect sizes as has been suggested by other investigators (Nakagawa, 2004; Rothman, 1990). Within group pre to post and pre to follow-up effect sizes were calculated with d = mean group 1 − mean group 2/pooled SD (Cohen, 1988). Chi-square tests were used to examine whether at pre and posttest groups differed with respect to prevalence of child and maternal PTSD.

Results

Cumulative risk exposure

The prevalence of exposure to the 8 TSEs was as follows: physical abuse (29.3%); sexual abuse (12%); witnessing domestic violence (97.3%); neglect (5%); separation from a caregiver (100%); caregiver criminal history (5.3%); caregiver substance abuse (16%); and caregiver mental illness (88%). High prevalence rates of domestic violence exposure and separation from a caregiver are related to study criteria. Of the children, 12% had experienced 2 TSEs, 41.3% had 3 TSEs, and 46.7% had 4+ TSEs.

Attrition

Intake to posttest. Attrition was stringently defined as not completing at least part of the post assessment and included a family who moved out of state immediately after randomization and two families who completed treatment but did not participate in the outcome assessment.

At posttest, the attrition rate was 14.3% (n = 6) in the treatment group and 12% (n = 4) in the comparison group. Analyses showed no differences between those who dropped out and those who completed treatment on any outcome variable or on

Table 1
Means (standard deviations) by treatment group and risk status.

	<4 TSE			4+ TSE		
	Pre	Post	FU	Pre	Post	FU
Child						
PTSD						
CPP	7.59 (3.91)	6.05 (4.50)		9.15 (3.48)	4.60 (2.58)	
Comparison	5.22 (3.52)	5.11 (4.14)		9.23 (2.79)	9.27 (3.15)	
Depression						
CPP	1.32 (1.39)	1.00 (1.41)		2.25 (1.71)	1.00 (1.38)	
Comparison	1.17 (1.34)	.83 (.99)		1.73 (1.67)	1.93 (1.58)	
Co-occurring diagnoses						
CPP	.82 (.85)	.59 (.91)		1.50 (1.00)	.50 (.89)	
Comparison	.44 (.70)	.39 (.61)		1.47 (1.13)	1.13 (.83)	
Total CBCL						
CPP	58.27 (12.06)	56.73 (12.01)	55.55 (13.47)	63.05 (10.95)	55.75 (10.12)	49.95 (8.98)
Comparison	56.78 (10.07)	55.39 (10.79)	52.28 (10.23)	62.40 (8.58)	65.87 (8.42)	63.87 (8.53)
Mother						
PTSD						
CPP	47.68 (26.82)	29.68 (26.11)		51.85 (23.20)	32.95 (17.42)	
Comparison	47.78 (19.20)	33.11 (19.65)		55.13 (24.52)	53.73 (25.28)	
Depression						
CPP	63.73 (12.01)	56.14 (14.27)	55.36 (12.51)	64.20 (7.37)	57.20 (9.92)	56.75 (11.68)
Comparison	60.94 (7.20)	56.89 (11.45)	54.28 (13.14)	66.67 (8.62)	65.80 (9.16)	64.40 (7.13)

Note: SD given in parentheses. Sample size: CPP <4 TSE ($n = 22$); comparison <4 TSE ($n = 18$); CPP 4+ TSE ($n = 20$); comparison 4+ TSE ($n = 15$).

children's level of trauma exposure. Children who dropped out tended to be older: $t(73) = -2.08$, $p < .05$ (two-tailed), $d = .75$. There were no other demographic differences.

Posttest to follow-up. At follow-up, an additional 2 treatment and 4 comparison group dyads dropped from the study. Seven additional treatment dyads were not assessed because their treatment ended before the 6-month follow-up was added to the study. The final follow-up sample included 27 treatment and 25 comparison group dyads. Dyads who completed the follow-up did not differ from those who did not on any of the outcome variables. Additional details regarding the follow-up sample and attrition rates are provided in Lieberman et al. (2006).

Differences between risk groups

As hypothesized, children with 4+ TSEs showed significantly greater impairment across all child symptom domains. They had a greater number of PTSD symptoms [$t(73) = -3.24$, $p < .01$, $d = .75$] and depression symptoms [$t(73) = -2.21$, $p < .05$, $d = .42$], met criteria for more DC: 0–3 diagnoses [$t(73) = -3.92$, $p < .001$, $d = .91$], and had significantly greater behavior problems [$t(73) = -2.12$, $p < .05$, $d = .49$]. Mothers of children with 4+ TSEs did not differ from those with <4 TSEs on any maternal symptom measure.

Treatment effectiveness across risk status

ITT sample means and standard deviations for all outcome measures at pre, post, and follow-up are shown in Table 1. TC means and standard deviations are available from the first author. Results from GLM analyses are shown in Table 2. Results from post hoc tests and Cohen's d within-group effect sizes are shown in Table 3.

Child functioning. For child PTSD, significant time and time × treatment effects were found in both ITT and TC samples. There was also a significant time × treatment × TSE effect in the ITT sample. Post hoc analyses showed significant reductions for the CPP <4 and CPP 4+ groups for ITT and TC samples and no significant reductions for the Comparison <4 or Comparison 4+ groups.

To examine clinically significant reductions in PTSD symptoms, chi-square tests were used to compare the number of CPP and comparison group children diagnosed with PTSD in the <4 and 4+ TSE groups. At intake, although 4+ TSE children were more likely to have a diagnosis of PTSD [$X^2(1) = 5.70$, $p < .05$, $\phi = .28$], comparison <4 and CPP <4 children and comparison 4+ and CPP 4+ children did not differ in their prevalence of PTSD (ITT sample: comparison <4 = 27.8%, CPP <4: =36.4%; comparison 4+ = 53.3%, CPP +4 = 65%; TC sample; comparison <4 = 36.4%; CPP <4 = 30%; comparison 4+ = 41.2%; CPP 4+ = 60.9%). At posttest, there were statistically significant group differences for 4+ children in both ITT and TC samples [ITT: $X^2(1) = 10.48$, $p < .01$, $\phi = .55$; TC: $X^2(1) = 12.38$, $p < .001$, $\phi = .65$] with CPP children showing significantly lower rates of PTSD (ITT: 5%; TC: 0%) than comparison group children (ITT: 53%; TC: 55%). For the <4 group, chi-square tests were ns for ITT or TC samples.

For child depression, significant time and time × treatment effects were found in ITT and TC samples. The time × treatment × TSE interaction was significant for the ITT sample, with a trend towards significance in the TC sample. Follow-up analyses showed significant reductions in the number of symptoms of depression the child experienced for only the CPP 4+ group in both ITT and TC samples.

Table 2
General linear model analyses examining treatment effectiveness by risk status.

Variable	Sample	*df*	Time		Time × TSE		Time × Txt		Time × Txt × TSE	
			F	η^2	*F*	η^2	*F*	η^2	*F*	η^2
Pre to posttest										
Child										
PTSD	ITT	71	15.82***	.18	3.44+	.05	14.71***	.17	3.99*	.05
	TC	57	16.03***	.22	2.07	.04	15.03***	.21	2.45	.04
Depression	ITT	71	6.10*	.08	.33	.01	4.34*	.06	4.52*	.06
	TC	57	5.23*	.08	.12	.00	4.40*	.07	3.35+	.06
Co-occurring diagnoses	ITT	71	10.63**	.13	4.49*	.06	2.86+	.04	1.00	.01
	TC	57	9.73**	.15	3.36+	.06	2.06	.04	.29	.01
Total CBCL	ITT	71	2.78	.04	.05	.00	7.25**	.09	6.83*	.09
	TC	59	1.37	.02	.03	.00	6.88*	.10	7.41**	.11
Mother										
PTSD	ITT	71	25.73***	.27	1.40	.02	3.98*	.05	1.84	.03
	TC	55	24.89***	.31	1.92	.03	4.32*	.07	.65	.01
Depression	ITT	71	15.32***	.18	.58	.01	3.76+	.05	.27	.00
	TC	57	18.42***	.24	.87	.02	5.89*	.09	.00	.00
Pre to 6-month follow-up										
Child										
Total CBCL	ITT	71	16.24***	.19	.89	.01	7.47**	.10	12.19***	.15
	TC	48	16.11***	.25	2.07	.04	4.21*	.08	8.72**	.15
Mother										
Depression	ITT	71	24.73***	.26	1.14	.02	1.91	.03	.49	.01
	TC	47	30.84***	.40	1.69	.03	2.92+	.06	.68	.01

Note: TC = treatment completer sample; ITT = intent to treat sample.
+ $p < .1$
* $p < .05$
** $p < .01$
*** $p < .001$

Analyses of the number of co-occurring DC: 0–3 diagnoses showed a significant time effect in ITT and TC samples with a trend for the time × treatment interaction to be significant in the ITT sample. Post hoc analyses of both ITT and TC samples indicated significant reductions for the CPP 4+ group with a trend for the comparison 4+ group to show significant reductions.

Total CBCL analyses showed significant time × treatment and Time × treatment × TSE interactions in ITT and TC samples. Post hoc analyses demonstrate significant reductions for the CPP 4+ group whereas the Comparison 4+ group had a trend to increase in total CBCL scores. At 6-month follow-up significant time, time × treatment, and time × treatment × TSE effects were found for total CBCL scores in ITT and TC samples. Post hoc analyses showed significant reductions for the CPP 4+ group and a trend for the Comparison <4 group to show a reduction.

Maternal functioning. Analyses examining maternal PTSD showed significant time and time × treatment interactions in ITT and TC samples. Subsequent analyses revealed significant PTSD score reductions for comparison <4, CPP <4, and CPP 4+ groups, with no significant change for the comparison 4+ group.

Chi-square analyses examining maternal PTSD diagnosis show that at intake, comparison <4 and treatment <4 and comparison 4+ and treatment 4+ mothers did not differ in their prevalence of PTSD (ITT sample: comparison <4 = 39%, CPP <4 = 41%. comparison 4+ = 80%, CPP 4+ = 50%; TC sample; comparison <4 = 44%; CPP <4 = 38%; comparison 4+ = 67%; CPP 4+ = 56%). At posttest, in the ITT sample, CPP 4+ mothers were significantly less likely to have a diagnosis of PTSD [$X^2(1) = 7.70$, $p = .01$., $\phi = .47$], with 15% of CPP mothers and 60% of comparison group mothers meeting PTSD criteria. In the TC sample, although fewer CPP 4+ mothers met criteria for PTSD (CPP = 17% versus comparison = 44%), this difference was not statistically significant. No significant treatment differences for maternal PTSD were found for the <4 group.

For maternal depression, there was a significant time effect in ITT and TC samples. A significant time × treatment effect was found in the TC sample, with a trend for significance in the ITT sample. Post hoc analyses revealed significant reductions for the CPP <4 and CPP 4+ groups in ITT and TC samples. No significant change was found for the comparison <4 or 4+ groups. At 6-month follow-up, a significant time effect was found for maternal depression in both ITT and TC samples. There was a trend for the time × treatment interaction to reach significance in the TC sample but not the ITT sample. Follow-up analyses revealed significant reductions for the comparison <4, CPP <4, and CPP 4+ groups in both ITT and TC samples, with no significant change for the comparison 4+ group.

Discussion

The findings provide support for the efficacy of CPP with preschoolers who experienced multiple TSEs. Among those children with four or more TSEs (described here as high risk), those in the CPP group showed significantly greater improve-

Table 3
Results from post hoc tests and within-group effect sizes.

	Sample	CPP						Comparison					
		<4 TSE			4+ TSE			<4 TSE			4+ TSE		
		df	*t*	*d*	*df*	*t*	*d*	*df*	*t*	*d*	*df*	*t*	*d*
Pre to posttest													
Child													
PTSD	ITT	21	2.33*	.37	19	5.31***	1.49	17	.12	.03	14	.00	−.01
	TC	14	2.46*	.66	17	5.79***	1.79	16	.12	.03	10	.00	0
Depression	ITT	21	1.10	.23	19	3.26**	.80	17	1.07	.29	14	−.53	−.12
	TC	14	1.10	.37	17	3.36**	1.03	16	1.07	.30	10	−.52	−.15
Co-occurring diagnoses	ITT	21	.96	.26	19	3.45**	1.06	17	.25	.08	14	1.89+	.34
	TC	14	.96	.41	17	3.32**	1.12	16	.25	.09	10	1.84+	.44
Total CBCL	ITT	21	.84	.13	19	3.47**	.69	17	.64	.13	14	−1.91+	−.41
	TC	15	.45	.12	18	3.71**	.74	16	.56	.13	10	−1.98+	−.54
Mother													
PTSD	ITT	21	3.81**	.68	19	3.17**	.92	17	2.55*	.76	14	.50	.06
	TC	15	4.39***	.95	17	3.26**	1.02	15	2.60*	.82	8	.49	.08
Depression	ITT	21	2.70*	.58	19	3.19**	.80	17	1.72	.42	14	.41	.10
	TC	15	3.13**	.93	16	3.13***	.97	17	1.72	.39	9	.41	.12
Pre to 6-month follow-up													
Child													
Total CBCL	ITT	21	1.27	.21	19	4.78***	1.31	17	1.83+	.44	14	−1.18	−.17
	TC	11	.81	.23	14	5.11***	1.69	15	2.03+	.57	8	.26	.07
Mother													
Depression	ITT	21	3.72***	.68	10	3.03**	.76	17	2.29*	.63	14	1.12	.28
	TC	11	5.19***	1.13	14	3.88**	1.06	15	2.78*	.86	7	.95	.26

Note: TC = treatment completer sample; ITT = intent to treat sample. Within group pre to posttest effect sizes calculated with *d* = mean group 1 − mean group 2/pooled SD (Cohen, 1988).

+ $p < .1$
* $p < .05$
** $p < .01$
*** $p < .001$

ments than children in the comparison group. High-risk CPP children showed greater reductions in PTSD and depression symptoms, number of co-occurring DC: 0–3 diagnoses, and total behavior problems. Effect sizes were large ($d > 1$) for PTSD, depression and co-occurring diagnoses, and medium for total behavior problems. Compared to the comparison 4+ group, children in the CPP 4+ group were also significantly less likely to be diagnosed with PTSD at post-treatment (5% versus 53% in the ITT sample and 0% versus 55% in the TC sample).

Although the primary goal of this study was to examine CPP efficacy for preschoolers exposed to multiple TSEs, the results continue to support greater CPP efficacy for children with exposure to fewer TSEs as well. The CPP group with <4 TSEs showed significant improvement, with a moderate effect size ($d = .66$) on PTSD symptoms, whereas the comparison group did not. While significant treatment effects were not found for the CPP <4 group on depression, number of co-occurring diagnoses and behavior problems, this may be due to the fact that children with <4 TSEs showed less impairment at intake than did high risk children, making these measures less clinically relevant for this subgroup.

As was found in the original published RCT study (Lieberman et al., 2005), the data suggest that CPP has individual benefits for mothers and may be especially efficacious for mothers of high-risk children although the mothers' individual psychological status was not a direct target of the treatment. In the <4 TSE group, both treatment and comparison group mothers showed significant improvements in PTSD, but only CPP mothers showed significant posttreatment reductions in depression. Within-group effect sizes were moderate to large for the CPP group. In the 4+ TSE group, CPP mothers showed significant reduction in PTSD and depression, with large effects in all these areas ($d > .90$), whereas comparison group mothers showed no improvements in any of these domains. Analyses also suggest that CPP is more effective in reducing the prevalence of PTSD in mothers of high-risk children. Data demonstrating improved maternal functioning for CPP mothers are especially interesting because 73% of mothers in the comparison group received individual therapy. As a whole, the findings suggest that, by strengthening the parent-child relationship, CPP has significant positive effects not only for the child's psychological functioning but for the mother's as well. Mothers may receive both direct and indirect benefits from CPP treatment. By directly participating in their child's treatment, mothers may learn to recognize and deal with difficult affect related to trauma and become involved in the co-construction of a trauma narrative that helps them make meaning of their experience. Mothers may also benefit indirectly from reduced stress and increased self-efficacy as the result of improvement in their children's symptoms, and from the feeling that they contributed to their children's recovery by participating in treatment.

Follow-up data, collected 6-months after treatment ended, suggest that treatment gains are maintained for the high-risk group. The CPP 4+ group showed significant reductions in children's behavior problems and maternal depression while the

comparison 4+ group did not. These results are promising and suggest that working within the context of the caregiver-child relationship may have benefits for the child and caregiver's functioning that endure after treatment ends.

Limitations

A primary limitation of this study is the small sample size. The original intent of the randomized trial was to examine CPP efficacy. Although the importance of examining the effectiveness of the treatment for children exposed to multiple TSEs warrants a reanalysis of the data, the sample size limits the statistical power of the analyses. Nevertheless, the findings that statistically significant results were obtained with a small sample and that effect sizes were robust and consistent across measures provide support for the preliminary conclusion that CPP is efficacious for children with 4+ TSEs. Kraemer, Wilson, Fairburn, and Agras (2002) cogently argue that much can be learned from reanalysis of data from successfully completed randomized control trials and note that analyses of this type are supported for the purpose of hypothesis generation for future studies.

Additional limitations include reliance on maternal report, which is difficult to avoid in research with young children, and limited resources, which restricted the number of measures administered at follow-up. Follow-up analyses were limited to the CBCL and SCL-90-R depression scale, chosen because they were robust measures of functioning, but did not include clinical interviews to measure maternal PTSD, child depression and child PTSD because of the expense involved in collecting these data. Additionally, the only longitudinal data collected was the 6-month follow-up. Future studies should involve larger samples to allow for more complex analyses examining efficacy by type, severity, and chronicity of trauma exposure. Longer follow-up periods would also aid in understanding the potential long term benefits of treatment.

One additional limitation involves the dichotomization of children into <4 and 4+ TSE risk groups. Dichotomization is common in risk factor research and prior literature supports a <4 versus 4+ dichotomization (e.g., Sameroff, Seifer, Zax, & Barocas, 1987; Yumoto et al., 2008). Nevertheless, additional research is needed to determine whether type, frequency, and severity of risk are more potent predictors of treatment outcome than number of risks (Lau et al., 2005). This question should be examined in future studies with larger samples. Further, it is important to note that due to study entry criteria, nearly all children in the <4 group had experienced at least 2 TSEs, significant separation from their biological father and witnessing domestic violence. While CPP was found to be more effective than comparison in this group and in the 4+ group, additional research might examine whether this also true for children with 1 TSE.

Clinical implications

This reanalysis of previously published RCT data reveals several findings that have important implications for the field of child trauma. First, the high incidence of risk factors highlights the importance of systematically assessing for adverse and traumatic events in young children referred to treatment. The only risk factors required for study participation were child exposure to DV and separation from the perpetrator of the violence, but 47% of the sample had experienced 4 or more TSEs. Nearly a third of the mothers (30%) reported the child had been physically abused and 12% reported child sexual abuse. Given recent research suggesting the connection between these adverse experiences and later health risk behaviors and mental and physical health disorders (e.g., Felitti et al., 1998), these findings highlight the need for screening and treatment programs that target young children. Second, the data suggest that the CPP relationship-based treatment approach can be particularly effective for children who experienced multiple risks and confirm the importance of including caregivers in treatment, as recommended by Cohen (1998) practice parameters for the treatment of PTSD in children and adolescents. Third, because the sample was drawn predominantly from ethnic minority low-income populations, the study provides preliminary support for the proposition that CPP may be effective in addressing the gap between clinical need and availability of culturally informed treatment for these groups. Finally, the study presents preliminary data that CPP is effective not only in reducing PTSD symptoms but also in reducing co-occurring symptoms and disturbances that are associated with exposure to complex trauma (Cook et al., 2005; Cloitre et al., 2009). This finding is consistent with the need for treatments that enhance the child's development across different domains of functioning.

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References

Achenbach, T. M. (1991). *Manual for The Child Behavior Checklist/4–18 and 1991 profile*. Burlington, VT: University of Vermont, Department of Psychiatry.
Achenbach, T. M. (1992). *Manual for child behavior checklist/2–3 and 1992 profile*. Burlington, VT: University of Vermont, Dept. of Psychiatry.
Altman, D. G. (2009). Missing outcomes in randomized trials: Addressing the dilemma. *Open Medicine*, *3*(2), 51–53.
Belsky, J., & Fearon, R. M. (2002). Infant–mother attachment security, contextual risk, and early development: A moderational analysis. *Development and Psychopathology*, *14*(2), 293–310.
Bowlby, J. (1969/1982). *Attachment and Loss: Vol I Attachment*. New York: Basic Books.

Cicchetti, D., Rogosch, F. A., & Toth, S. L. (2006). Fostering secure attachment in infants in maltreating families through preventive interventions. *Development and Psychopathology*, *18*, 623–650.
Cicchetti, D., Toth, S. L., & Rogosch, F. A. (1999). The efficacy of toddler–parent psychotherapy to increase attachment security in offspring of depressed mothers. *Attachment and Human Development*, *1*, 34–66.
Cicchetti, D., & Toth, S. L. (2000). Developmental processes in maltreated children. In D. Hansen (Ed.), *Nebraska symposium on motivation: Vol. 46. Child Maltreatment* (pp. 85–165). Lincoln: University of Nebraska Press.
Cloitre, M., Stolbach, B. C., Herman, J. L., van der Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). A developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress*, *22*(5), 399–408.
Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
Cohen, J. A. (1998). Work group on quality issues practice parameters for the assessment and treatment of children and adolescents with posttraumatic stress disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, *37*(10 Suppl.), 4S–26S.
Cook, A., Spinazzola, J., Ford, J., Lanktree, C., Blaustein, M., Cloitre, M., DeRosa, R., Hubbard, R., Kagan, R., Liautaud, J., Mallah, K., Olafson, E., & van der Kolk, B. (2005). Complex trauma in children and adolescents. *Psychiatric Annals*, *35*(5), 390–398.
Courchesne, E., Chisum, H. J., Townsend, J., Cowles, A., Covington, J., Egaas, B., Harwood, M., Hinds, S., & Press, G. A. (2000). Normal brain development and aging: Quantitative analysis at in vivo MR imaging in healthy volunteer. *Radiology*, *216*, 672–682.
Deater-Deckard, K., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1998). Multiple risk factors in the development of externalizing behavior problems: Group and individual differences. *Development and Psychopathology*, *10*(3), 469–493.
Derogatis, L. R. (1994). *Symptom Checklist-90-R: Administration, scoring, and procedures manual*. Minneapolis: National Computer Systems.
Dube, S. R., Felitti, V. J., Dong, M., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: Evidence from four birth cohorts dating back to 1900. *Preventive Medicine*, *37*, 268–277.
Egger, H., & Angold, A. (2004). Stressful life events and PTSD in preschool children. In *Paper presented at the annual meeting of the American Academy of Child and Adolescent Psychiatry* Washington, DC.
European Medicines Agency (EMEA) (2009). Committee for medicinal products for human use (CHMP): ICH E9 guideline on missing data in confirmatory clinical trials. Retrieved from http://www.ema.europa.eu/pdfs/human/ewp/177699endraft.pdf.
Evans, G. W. (2003). A multimethodological analysis of cumulative risk and allostatic load among rural children. *Developmental Psychology*, *39*(5), 924–933.
Fantuzzo, J., & Fusco, R. (2007). Children's direct sensory exposure to substantiated domestic violence crimes. *Violence and Victims*, *22*(2), 158–171.
Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. *American Journal of Preventive Medicine*, *14*(4), 245–258.
Fraiberg, S. (1980). *Clinical Studies in Infant Mental Health*. New York: Basic Books.
Ghosh Ippen, C., & Lieberman, A. F. (2008). Infancy and early childhood. In G. Reyes, J. Elhai, & J. Ford (Eds.), *Encyclopedia of psychological trauma* (pp. 345–353). New York: Wiley & Sons.
Greenberg, M. T., Speltz, M. L., DeKlyen, M., & Jones, K. (2001). Correlates of clinic referral for early conduct problems: Variable and person-oriented approaches. *Development and Psychopathology*, *13*, 255–276.
Gutman, L. M., Sameroff, A. J., & Cole, R. (2003). Academic growth curve trajectories from 1st grade to 12th grade: Effects of multiple social risk factors and preschool child factors. *Developmental Psychology*, *39*(4), 777–790.
Keane, T. M., Fairbank, J. A., Caddell, J. M., Zimering, R. T., Taylor, K. L., & Mora, C. A. (1989). Clinical evaluation of a measure to assess combat exposure. *Psychological Assessment*, *1*, 53–55.
Kraemer, H. C., Wilson, G. T., Fairburn, C. G., & Agras, W. S. (2002). Mediators and moderators of treatment effects in randomized clinical trials. *Archives of General Psychiatry*, *59*, 877–883.
Lau, A. S., Leeb, R. T., English, D., Graham, J. C., Briggs, E. C., Brody, K. E., & Marshall, J. M. (2005). What's in a name? A comparison of methods for classifying predominant type of maltreatment. *Child Abuse & Neglect*, *29*, 533–551.
Liaw, F., & Brooks-Gunn, J. (1994). Cumulative familial risks and low-birthweight children's cognitive and behavioral development. *Journal of Clinical Child Psychology*, *23*(4), 360–372.
Lieberman, A. F., Weston, D. R., & Pawl, J. H. (1991). Preventive intervention and outcome with anxiously attached dyads. *Child Development*, *62*, 199–209.
Lieberman, A. F., & Van Horn, P. (2005). *Don't hit my mommy: a manual for child parent psychotherapy with young witnesses of family violence*. Washington, DC: Zero to Three Press.
Lieberman, A. F., Van Horn, P. J., & Ghosh Ippen, C. (2005). Toward evidence-based treatment: Child-Parent Psychotherapy with preschoolers exposed to marital violence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *44*, 1241–1248.
Lieberman, A. F., Ghosh Ippen, C., & Van Horn, P. (2006). Child-Parent Psychotherapy: 6-month follow-up of a randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, *45*, 913–918.
Lieberman, A. F., & Van Horn, P. (2008). *Psychotherapy with Infants and Young Children: repairing the Effects of Stress and Trauma on Early Attachment*. New York, NY, US: Guilford Press.
Lynch, M. (2006). Children exposed to community violence. In M. M. Feerick, & G. B. Silverman (Eds.), *Children exposed to violence* (pp. 9–52). Baltimore, MD: Paul H. Brookes Publishing Co.
Morales, J. R., & Guerra, N. G. (2006). Effects of multiple context and cumulative stress on urban children's adjustment in elementary school. *Child Development*, *77*(4), 907–923.
Nakagawa, S. (2004). A farewell to Bonferroni: The problem of low statistical power and publication bias. *Behavioral Ecology*, *15*(6), 1044–1045.
President's New Freedom Commission on Mental Health (2003). Achieving the promise: Transforming mental health care in America. http://www.mentalhealthcommission.gov/reports/FinalReport/toc.html.
Richters, J. E., & Martinez, P. E. (1993). The NIMH Community Violence Project: Children as victims of and witnesses to violence. In D. Reiss, J. E. Richters, M. Radke-Yarrow, & D. Scharf (Eds.), *Children and violence* (pp. 7–21). New York: Guilford Press.
Rothman, K. J. (1990). No adjustments are needed for multiple comparisons. *Epidemiology*, *1*(1), 43–46.
Rutter, M. (1979). Protective factors in children's responses to stress and disadvantage. In M. W. Kent, & J. E. Rolf (Eds.), *Primary prevention of psychopathology: Social competence in children* (pp. 49–74). Hanover, NH: University Press of New England.
Sameroff, A. J., Seifer, R., Baldwin, A., & Baldwin, C. (1993). Stability of intelligence from preschool to adolescence: The influence of social and family risk factors. *Child Development*, *64*, 80–97.
Sameroff, A., Seifer, R., & McDonough, S. C. (2004). Contextual contributors to the assessment of infant mental health. In R. DelCarmen-Wiggins, & A. Carter (Eds.), *Handbook of infant, toddler, and preschool mental health assessment* (pp. 61–78). New York: Oxford University Press.
Sameroff, A., Seifer, R., Zax, M., & Barocas, R. (1987). Early indicators of developmental risk: Rochester longitudinal study. *Schizophrenia Bulletin*, *13*(3), 383–394.
Scheeringa, M. S., Zeanah, C. H., Drell, M. J., & Larrieu, J. A. (1995). Two approaches to the diagnosis of posttraumatic stress disorder in infancy and early childhood. *Journal of the American Academy of Child and Adolescent Psychiatry*, *34*, 191–200.
Shonkoff, J. P., & Phillips, D. A. (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.
Sroufe, A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005). *The development of the person*. New York: The Guilford Press.
Straus, M. A., Hamby, S. L., Boney-McCoy, S., & Sugarman, D. B. (1996). The revised Conflict Tactics Scales (CTS2): Development and preliminary psychometric data. *Journal of Family Issues*, *17*, 283–316.
Toth, S. L., Maughan, A., Manly, J. T., Spagnola, M., & Cicchetti, D. (2002). The relative efficacy of two interventions in altering maltreated preschool children's representational models: Implications for attachment theory. *Developmental Psychopathology*, *14*, 877–908.

Toth, S. L., Rogosch, F. A., Cicchetti, D., & Manly, J. T. (2006). The efficacy of toddler–parent psychotherapy to reorganize attachment in young offspring of mothers with major depressive disorder: A randomized trial. *Journal of Consulting and Clinical Psychology*, *74*(6), 1006–1016.

US Department of Health and Human Services (2007). America's children: Key national indicators of well-being, 2007. Downloaded July 14, 2007 from: http://www.childstats.gov/americaschildren/famsoc7.asp.

United States Department of Justice. (1998). *Violence by intimates: Analysis of data on crimes by current or former spouses, boyfriends, and girlfriends*. Washington, DC: Author.

Watamura, S. E., Donzella, B., Kertes, D. A., & Gunnar, M. R. (2004). Developmental changes in baseline cortisol activity in early childhood: Relations with napping and effortful control. *Developmental Psychobiology*, *45*, 125–133.

Weathers, F. W., & Litz, B. T. (1994). Psychometric properties of the clinician-administered PTSD Scale, CAPS-1. PTSD. *Research Quarterly*, *5*, 2–6.

Werner, E. E. (1996). Vulnerable but invincible: High risk children from birth to adulthood. *European Child and Adolescent Psychiatry*, *5*, 47–51.

Yumoto, C., Jacobson, S. W., & Jacobson, J. L. (2008). Fetal substance exposure and cumulative environmental risk in an African American Cohort. *Child Development*, *79*(6), 1761–1776.

Zeanah, C., & Zeanah, P. (2009). The scope of infant mental health. In C. H. Zeanah (Ed.), *Handbook of infant mental health* (3rd ed., pp. 5–21). New York: Guilford Press.

Zero to Three: National Center for Clinical Infant Programs. (1994). *Diagnostic classification: 0–3. Diagnostic classification of mental health and developmental disorders of infancy and early childhood*. Washington, DC: Zero to Three: National Center for Clinical Infant Programs.