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J Fam Violence. 2015 July 1; 30(5): 633–642. doi:10.1007/s10896-015-9695-9.**Maternal Factors as Moderators or Mediators of PTSD Symptoms in Very Young Children: A Two-Year Prospective Study****Michael S. Scheeringa,**

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Abstract

Research has suggested that parenting behaviors and other parental factors impact the long-term outcome of children's posttraumatic stress disorder (PTSD) symptoms. In a sample of 62 children between the ages of one and six who experienced life-threatening traumas, PTSD was measured prospectively two years apart. Seven maternal factors were measured in a multi-method, multi-informant design. Both moderation and mediation models, with different theoretical and mechanism implications, were tested. Moderation models were not significant. Mediation models were significant when the mediator variable was maternal symptoms of PTSD or depression (measured at Time 1), self-report of maternal escape/avoidance coping (measured at Time 2), or self-report emotional sensitivity (measured at Time 2). Greater maternal emotional sensitivity was associated with greater Time 2 PTSD symptoms among children. Observational measures of emotional sensitivity as the mediator were not supported. Correlation of parents' and children's symptoms is a robust finding, however caution is warranted in attributing children's PTSD symptoms to insensitive parenting.

Keywords

post-traumatic stress; family; assessment; parenting

Children's exposure to traumatic experiences can affect parents directly when the parents are simultaneously exposed, as in domestic violence (Gewirtz, Degarmo, & Medhanie,

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2011; Schechter et al., 2010), war (Feldman & Vengrober, 2011; Thabet, Ibraheem, Shivram, Winter, & Vostanis, 2009), disasters (Birmes et al., 2009; Bokszczanin, 2008; Kelley et al., 2010; Wilson, Lengua, Meltzoff, & Smith, 2010), and automobile collisions (Allenou et al., 2010). Parents also can be affected indirectly or vicariously through parental concern for their children's well-being following accidental injuries (Le Brocque, Hendrikz, & Kenardy, 2010), life-threatening illnesses (Pelcovitz et al., 1998), and sexual abuse (Deblinger, Steer, & Lipmann, 1999; Famularo, Fenton, Kinscherff, Ayoub, & Barnum, 1994). Reviews of the literature have indicated a consistent pattern that children with more maladaptive outcomes following trauma (e.g., posttraumatic stress, internalizing, and externalizing problems) have caregivers and families with greater problems (e.g., parental symptoms and dysfunctional family patterns) (Gewirtz, Forgatch, & Wieling, 2008; Scheeringa & Zeanah, 2001). Inferring that these issues for caregivers and families account for a portion of children's problems through unfavorable parent-child relationships, calls have been made for greater attention to interventions focused on parenting practices following traumatic experiences (Gewirtz et al., 2008).

Among the several dozen studies that implicate parenting practices in children's post-trauma adaptation (Belsky & de Haan, 2011; Dekel & Goldblatt, 2008; Gewirtz et al., 2008; Kellerman, 2001; Scheeringa & Zeanah, 2001), there are two major limitations. First, few studies employed observational measures of actual parenting (Feldman & Vengrober, 2011; Gewirtz et al., 2011; Levendosky, Huth-Bocks, Shapiro, & Semel, 2003; Schechter et al., 2010). The dearth of observational measures of parenting limits our ability to conclude whether parental and family characteristics translate into actual parenting practices and how those parenting practices influence children's outcomes (Belsky & de Haan, 2011). Second, few studies have used prospective longitudinal designs (Gewirtz et al., 2011; Kelley et al., 2010; Koplewicz et al., 2002; Laor, Wolmer, Mayes, & Gershon, 1997; McFarlane, 1987; Silk et al., 2009; Wilson et al., 2010). Interpretations of cross-sectional designs provide a limited ability to sort out direction of effects and no way to observe changes in outcomes over time.

There are conceptual and methodological challenges for the measurement of parenting behaviors. Both moderation and mediation models are valuable in psychosocial research because they may better reflect the complexity of multi-factorial processes compared to simple main effects models, but there are important fundamental differences between them. In moderator models, the moderator (the quality of caregivers' relationships with their children) is a stable characteristic that exists in time prior to the outcome of interest. The moderator affects the strength of the relations between the traumatic events and the children's symptomatic responses, amplifying or attenuating them. Scheeringa and Zeanah (2001) have discussed this explicitly in terms of posttraumatic stress disorder (PTSD) as a Moderating Effect. One expects the predictor levels and moderator levels to be independent and uncorrelated (Kraemer, Kiernan, Essex, & Kupfer, 2008; Kraemer, Wilson, Fairburn, & Agras, 2002).

In mediation models, the mediator (the quality of caregivers' relationships with their children) is not stable. The mediator is affected by the predictor (traumatic events) and in turn exerts an effect on the outcome (children's symptoms). The predictor has an indirect

causal effect on the outcome through the mediator. The parents may have been impacted directly by the same traumatic events (e.g., domestic violence), or they may have been impacted indirectly by the emotional impact of witnessing their children's distress. This leads to compromised responsiveness from the parents, which in turn affects their children's posttraumatic symptomatology, which Scheeringa and Zeanah (2001) termed the Compound Effect.

When observational measures of parenting have been used, the models and methods have varied considerably. In a sample of 148 mothers of 1–5 year-old war-exposed children in Israel, maternal sensitivity was observed when children were present as mothers were interviewed about their own PTSD symptoms (Feldman & Vengrober, 2011). The children with PTSD had caregivers with more PTSD, depression, and anxiety symptoms, and less maternal sensitivity compared to the exposed-but-no-PTSD and non-exposed control groups. In a sample of 120 7–12 year-old children who witnessed domestic violence (Levendosky & Graham-Bermann, 2001), the findings supported parenting, measured with the self-report Parenting Style Survey (Sameroff, Thomas, & Barrett, 1990), as a partial mediator for the impact of domestic violence on children's problem behaviors.

Other studies however, have failed to find significance from parental factors in the expected directions. In a study of 103 mothers and their preschool-age children (Levendosky et al., 2003), many of whom had experienced domestic violence, neither maternal symptoms nor observed parenting, measured with the Eyberg task (Eyberg & Robinson, 1981), had a mediating impact on children's internalizing or externalizing behaviors, measured with the Child Behavior Checklist (Achenbach & Edelbrock, 1983). Interestingly, abused women saw themselves as more effective parents by their self-reports, contrary to expectations. In a study of 74 1–4 year-old children, neither observed atypical maternal behavior (measured during separation and reunion episodes) nor time spent in joint attention (measured during free play) were significantly correlated with maternal PTSD or depression symptoms (Schechter et al., 2010). Additionally, in a study of 35 6–12 year-old children exposed to domestic violence, observed parenting (measured during a series of standardized interaction tasks) was not significantly associated with maternal distress or with children's posttraumatic or depression symptoms (Gewirtz et al., 2011).

The handful of prospective studies has also produced some puzzling results. In the largest prospective study of 241 youth, following an Australian bushfire, maladaptive parent and family variables assessed at two, eight, and 26 months consistently associated with concurrently elevated PTSD symptoms in the children (McFarlane, 1987). However, following the first World Trade Center bombing in 1993, elevated parental PTSD symptoms correlated with elevated children's PTSD symptoms nine months after, but not three months after the event (Koplewicz et al., 2002). Furthermore, following SCUD missile attacks in Israel, a similar temporal relationship was shown, with maternal intrusive PTSD symptoms positively correlated with child PTSD symptoms in three- and four-year-old displaced children 30 months after the attacks, but not six months after the attacks (Laor et al., 1997), but no significant correlations were found between maternal and child PTSD symptoms with the five-year-old children.

Based on the prior research that was largely cross-sectional and showed inconsistent results when actual parenting was measured, an inference that parenting (which may or may not be impacted by the traumatic experiences) impacts children's outcomes may be viewed with some caution or may need additional precision that applies to narrower constructs or populations. To address these gaps, we followed trauma-exposed young children for two years and measured parenting practices with multiple methods. Whereas prior studies have tested only moderation or mediation, or left the models unspecified, we proposed testing both types of models with appropriate statistical models with the same dataset. Hypotheses 1 tested maternal emotional sensitivity (ES) as a moderator of the relationship between Time 1 and Time 2 children's PTSD symptoms. Hypothesis 2, testing mediation, was that maternal caregivers' T1 emotional sensitivity would mediate the relationship between children's T1 PTSD symptoms and T2 PTSD symptoms. It was expected that both moderator and mediation hypotheses would not be simultaneously true; if an interaction effect exists (i.e., moderation) this would violate the assumptions inherent in mediation (Kraemer et al., 2008; Kraemer et al., 2002).

The primary model tested was observationally-measured parental behavior (emotional sensitivity) at T1 as the moderator or mediator, and children's PTSD symptoms at T2 (two years later) as the outcome. To explore the specificity of this model, parental factors measured with multiple methods at multiple time points will be explored as moderator or mediator variables (T1 observed discipline, T1 maternal PTSD and depression symptoms, T2 observed emotional sensitivity, T2 self-report emotional sensitivity, and T2 self-report of general coping style).

Method

Participants

Sixty-two traumatized children were recruited from an inpatient unit of a level I trauma center, three battered women's shelters, an outpatient mental health clinic, a cancer center, and by word of mouth. The distribution of ages was one year (23 months) (n=1), two years (n=8), three years (n=13), four years (n=14), five years (n=14), and six years (n=12) of age. The types of trauma included witnessed domestic violence (n=27), acute injury traumas (n=26, mostly motor vehicle collisions), cancer patients who experienced highly invasive and repeated medical procedures (n=6), and sexual or physical abuse (n=3). Our inclusion criteria required that the children show at least one symptom of PTSD more than two months after the event. At least one symptom was required because we sought to make sure that we were not too liberal in the types of traumas that were included. Exclusion criteria included (1) disabling preexisting medical disorders, (2) severe developmental disorders, and (3) for the trauma service victims, a Glasgow Coma Scale score of <6 in the emergency department (a score <6 often prevents having a substantial memory of the event and indicates marked cognitive deficits that would make them different from the other injured children). No potential subjects met the exclusion criteria. Three families refused to participate when they were approached.

Children's mean age was 4.1 years (SD 1.4), 56% male, 55% Black/African-American, and 45% White/Caucasian. Maternal caregivers mean age was 30.3 years (SD 7.8) on average

with 12.3 years (SD 1.7) of education and 48% were employed. Fathers lived in the home only 16% of the time. Thirty-five could be found and re-assessed at T2.

Measures

Posttraumatic Stress Disorder Semi-structured Interview and Observational Record for Infants and Young Children (PTSD-SSI) (Scheeringa, Peebles, Cook, & Zeanah, 2001)—This parent interview was used for T1. This interview allows observations of the children to inform the ratings, but only parent interviews were used in this study. The wordings for five of the items (recollections, flashbacks, diminished interests, detachment, and irritability) were modified to make them more developmentally sensitive for this age group based on a series of diagnostic validity studies (Scheeringa et al., 2001; Scheeringa, Zeanah, Drell, & Larrieu, 1995; Scheeringa, Zeanah, Myers, & Putnam, 2003). Symptoms must have been present for at least one month. The PTSD-SSI has shown criterion, discriminant (Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008; Scheeringa et al., 2001), and predictive validity (Scheeringa, Zeanah, Myers, & Putnam, 2005) in this population. A random sample of 18% of the interviews ($n = 11$) were double coded from videotape for interrater reliability. Cohen's k for all 18 PTSD items was 0.75.

NIMH Diagnostic Interview Schedule for Children, Version IV (DISC)—For Time 2 (T2), we used the DISC PTSD module instead of the PTSD-SSI because many of the children would be older than six years at the follow-ups. The DISC has shown moderate to excellent test-retest reliability for multiple disorders, ranging from 0.54 to 0.79 (Shaffer, Fisher, & Lucas, 2000). Despite the absence of psychometric data on the PTSD module, we chose it because the DISC is the most widely used diagnostic instrument for youth and the questions directly reflect the DSM-IV criteria. Accommodations were made in this study to measure the five PTSD items noted earlier with different wording to make them developmentally-sensitive. Raters were trained to (1) record recollections with and without distress, (2) record flashbacks based on behavioral observations without verbal confirmation from a child about the nature of the flashback, and (3) record irritability if manifest as the new onset of extreme temper tantrums. A separate sheet of questions was added at the end to rate (4) the alternative wording for the diminished interests (constriction of play) and (5) detachment items (social withdrawal). This allowed, for example, diminished interests to be recorded by the DSM-IV wording by the original DISC question or by the alternative method wording with the added question. The module starts with an inventory of traumatic life events that was used to systematically track the occurrence of new events between visits.

T1 Observed Emotional Sensitivity—We measured maternal caregivers' observed emotional sensitivity toward their children with the method used by Crowell and colleagues (Crowell & Feldman, 1989; Crowell, Feldman, & Ginsberg, 1988), which has discriminated between clinic-referred and nonclinical dyads. The dyad was videotaped during five minutes of free play, two minutes of clean up, and 20 minutes during four structured puzzle tasks. Subsequent puzzle tasks increased in difficulty, so that the third and fourth tasks were too difficult for the child to complete alone, thus increasing the demand for dyadic collaboration. The scoring system included eight caregiver variables: behavioral responsiveness, emotional responsiveness, positive affect, withdrawn/depressed, irritability/

anger, verbal aggression, positive discipline during clean-up, and negative discipline during clean up. For this study, the emotional responsiveness scale was used as an index of emotional sensitivity. It was rated on a Likert-style scale from 1 (poor) to 7 (excellent). Lower scores indicated caregivers who did not create a positive emotional context for their children, and were disinterested, withdrawn, or critical. Higher scores indicated caregivers who set a positive mood by showing enthusiasm, praise, anticipating frustration, and responded immediately to their children's needs. Two raters were trained to reliability with an expert rater. When a rater's score was within one point of the expert, they were considered in agreement. The percent agreements for rater 1 with the expert on 21 training tapes ranged from 71% to 100% (median 91%). The percent agreements for rater 2 with the expert ranged from 67% to 100% (median 91%). The percent agreements between rater 1 and rater 2 on the 21 reliability tapes ranged from 48% to 100% (median 95%). For the study, rater 1 scored 91% of the tapes, and rater 2 scored 9% of the tapes. Raters were blind to trauma status.

T1 Observed Discipline—The positive discipline and negative discipline scales from the above procedure were selected to measure a different type of caregiver interaction with their children during different activities than when emotional sensitivity was rated. Caregivers were directed by telephone calls from research assistants to instruct their children to clean up the toys and put them in a bucket. This was allowed to occur for a maximum of five minutes, after which the staff went into the room to either take the filled bucket or clean up the toys. Positive discipline rated direct and clear commands, facilitation, modeling, and approval. Negative discipline rated derogatory statements, threats, and negative physical contact. Each was rated on a 1–3 Likert scale by one of two raters who were trained to reliability as described in the preceding paragraph. The scales were summed so that the possible range was 2–6, with lower scores reflecting less positive and more negative behaviors of the caregivers.

T1 Maternal PTSD—The Davidson Trauma Scale (Davidson, 1995) is a 17-item self-report checklist of PTSD symptoms. The subject rates each item for both frequency and severity on a 0–4 5-point Likert scale. The range of possible scores is 0 to 136. Mean scores were 11.0 in a general population, 31.9 for subthreshold PTSD with impairment, and 64.4 for threshold PTSD (Davidson, Tharwani, & Connor, 2002). The DTS has shown high internal consistency with a Cronbach's alpha coefficient of .99 (Davidson et al., 1997).

T1 Maternal Depression—The Beck Depression Inventory (Beck, Steer, & Garbin, 1988) is a 21-item self-report checklist of depressive symptoms. The subject rates each item for severity on a 0–3 4-point Likert scale. The range of possible scores is 0–63. Guidelines suggest that severity be interpreted as 0–9 minimal, 10–16 mild, 17–29 moderate, and 30–63 severe (Beck et al., 1988); in general, a cutoff score of 18 is recommended for detection of patients in need of clinical services (Rudd & Rajab, 1995). The BDI has shown Cronbach's alpha values from 0.73 to 0.95 for internal consistency in a review of 25 studies (Beck et al., 1988).

T2 Observed Emotional Sensitivity—Using the Preschool Five Minute Speech Sample (Daley, Sonuga-Barke, & Thompson, 2003), caregivers were asked in private to speak for five minutes about their children and their relationships. The videotapes were coded later. The global items of Initial Statement, Warmth, and Relationship are coded on Likert scales of 0 (Positive), 1 (Neutral), and 2 (Negative). Emotional Over involvement was rarely endorsed and was not included in the scoring rubric. Items were reverse scored so that higher scores reflected more sensitivity. Positive Comments and Critical Comments are frequency counts of each type of statement. For this study, all five items were combined into a single continuous measure. If one or more positive comments were produced, they were assigned a score of 1; if no positive comments were produced they were assigned a score of 0. If no critical comments were produced they were assigned a score of 1; if one or more critical comments were produced they were assigned a score of 0. The possible range of scores was 0–10. The raters were trained by the scale developer, David Daley, and were trained on 20 reliability tapes coded by Daley.

T2 Perceived Emotional Sensitivity—The Posttrauma Inventory of Parental Style (PIPS) is a 34-question interview that measures caregivers' self-reported interactions with their children at home (Scheeringa, 2002). Each item is rated on a 0–4 Likert scale. The PIPS was created for this study to capture trauma-specific, in-home parenting behaviors. Sixteen questions ask about caregivers' reactions to specific PTSD symptoms (if applicable). The first probe for each symptom asks whether they “just watch or listen, or do you get involved?” as a measure of their avoidance. The second probe for each symptom asks, “when you get involved, does your child calm down?” as a measure of whether their interventions are helpful or counterproductive. Thirteen other items were theoretically based global questions about whether caregivers were overprotective (five items), appeared distressed or emotionally unavailable in front of their children (five items), or re-exposed their children to potentially frightening experiences (three items). These 45 items were summed for a total score with a possible range of 0–180. Higher scores indicate more sensitive parenting. Cronbach's alpha for internal consistency in this sample was .83.

T2 Self-Report Escape/Avoidance Coping—We used the escape/avoidance subscale of the Ways of Coping Questionnaire (WAYSRS) (Folkman & Lazarus, 1988), a self-report measure that captures generalized coping strategies, and was chosen as a non-trauma-related index of how children may experience parental coping behaviors in their home contexts. The WAYSRS is a 66-item self-report questionnaire that requires about 10 minutes. Only the escape/avoidance subscale (eight items) was used in this study as avoidant coping style has been found to strongly correlate with more PTSD symptoms (Bryant, Marosszeky, Crooks, Baguley, & Gurka, 2000; Eid, Johnsen, & Thayer, 2001). Items are rated from 0–3 in response to an identified stressor, with higher scores indicating more avoidance. The WAYSRS subscales were derived from factor analyses, and internal consistency, estimated with Cronbach's coefficient alpha, range from .61 to .79. Cronbach's alpha for the escape/avoidance scale in this sample was .78.

Procedure

The Tulane University Committee on the Use of Human Subjects approved this study. When participants arrived at the laboratory, the study was verbally explained to the caregivers, and they were given a consent form to read. Written informed consent was obtained. Caregivers were given financial compensation for their participation. Children were not given rewards for participating. A variety of measures were obtained at the visit. Data are reported only on the measures listed above.

Data Analysis

The primary model of interest was T1 observed caregiver emotional sensitivity as the moderator or mediator and T2 child PTSD symptoms as the outcome. All the other models are called secondary models. Secondary models involved replacing the moderator/mediator with the other parental factors to determine if model relationships were specific to T1 observed emotional sensitivity.

A power analysis for moderation was based on the actual mean number of T1 child PTSD symptoms (3.3) and standard deviation (2.6). Assuming a 1.5 SD decrease in PTSD symptoms at T2 for those with high observed emotional sensitivity and a 1.5 SD increase in PTSD symptoms for those with low emotional sensitivity, significance level of 0.05 alpha, and 0.80 power in a two-sided test, Lachenbruch's method estimated that 16 total subjects are needed (Lachenbruch, 1988). If smaller decreases and increases occur (1.0 SD), then 32 total subjects are needed. Moderation was tested with a variable x time interaction term and main effects included in SAS version 9.2 (Cary, NC). Independent variables were centered to reduce the risk of colinearity.

A power analysis to determine sample size needed for a test of mediation was conducted empirically with iteration. Following the method of Lockwood and MacKinnon (1998), when the predictor-to-mediator and mediator-to-outcome path effects are large ($r = 0.59$) (Lockwood & MacKinnon, 1998), sample sizes needed are 31 and 35 for 90% and 95% confidence intervals respectively. When the path effects are medium ($r = .39$), sample sizes needed are 35 and 56 for 90% and 95% confidence intervals respectively. Children's T1 PTSD symptoms were used as the predictor as indices of the severity of the traumatic events. As all children had been exposed to traumas, and frequency of traumatic events has been an unreliable index of trauma severity in young children (Scheeringa, Myers, Putnam, & Zeanah, 2012), trauma events were not used as predictors. Mediation was tested with the bias-corrected bootstrap method (BCBM), which has been shown to be the most accurate method to create confidence intervals of the mediated effect. This method corrects for bias in the central tendency of the estimate (MacKinnon, Lockwood, & Williams, 2004). The bootstrap method has been recommended to test mediation when sample sizes are small to moderate and the data are non-normal (Shrout & Bolger, 2002). The BCBM bootstrap confidence intervals were computed with the SAS program created by MacKinnon (MacKinnon, 2008).

Results

From the index trauma to T1, the mean length of time was 11.2 months ($SD = 11.0$), and the median was 7.5 months. The mean length of time between T1 and T2 was 24.8 months, and the median was 27 months. Only 1 subject in the T2 subsample experienced a new stressor between T1 and T2.

The means and standard deviations for the model variables are in Table 1. Both the children and the maternal caregivers were markedly symptomatic for PTSD symptoms. There were no significant differences on demographics, type of trauma, or model variables between those who were followed-up at T2 compared to those who were seen only at T1. There were also no significant differences on any model variables between type of trauma (mothers involved $n=27$ versus mothers not involved in children's traumas $n=35$).

The correlations between the model variables are reported in Table 2. For the primary model, there was a significant correlation between the predictor (T1 child PTSD symptoms) and parental factor (T1 observed emotional sensitivity) ($r = 0.36, p < .05$), but not between the parental factor and the outcome (T2 child PTSD symptoms) ($r = 0.15$), partially satisfying the suggested, but not required, conditions for a model of mediation. Correlations were often, but not always significant between variables in the secondary models.

Moderation

For all models, including the primary model, the moderator x time interaction terms in linear models were not significant, indicating lack of support for all moderation models.

Moderation was also tested within subgroups of those whose mothers were involved in their traumas ($n=27$) and those whose mothers were not involved in their traumas ($n=35$). Tests of the interaction terms in all of the models within each subgroup were nonsignificant.

Mediation

The BCBM 95% confidence interval for the T1 observed emotional sensitivity mediated effect included zero ($-0.056, 0.164$), indicating lack of support for the mediation model of primary interest (Table 3). In contrast, when the variables of T1 maternal PTSD symptoms, T1 maternal depression symptoms, T2 perceived emotional sensitivity, or T2 self-reported escape/avoidance were modeled as the mediator, the mediated effects were significant (95% confidence intervals did not include zero). As shown in Table 2, greater maternal PTSD and depression and higher escape/avoidance significantly positively correlated with T2 child PTSD, as anticipated. Contrary to expectations, T2 self-report emotional sensitivity significantly positively correlated with T2 child PTSD ($r = 0.68, p < .0001$), suggesting that caregivers with greater emotional sensitivity had children with more PTSD symptoms. Mediation was not tested within subgroups of those whose mothers were involved or not involved in their traumas because these tests would be underpowered.

Discussion

It is generally believed that the parent-child relationship is of central importance for normal social and emotional development (Crockenberg & Leerkes, 2000; Zeanah, Boris, & Larrieu, 1997). Among the constructs of social-emotional development, emotion regulation has been considered the keystone development in the early years of life, and maternal sensitivity in parent-child interactions has been viewed as the essential context in which this occurs (Crockenberg & Leerkes, 2000). This belief extends beyond normal development into speculation that parental factors can significantly influence the longitudinal course of child psychopathology (Zeanah, Boris, & Scheeringa, 1997). PTSD provides a unique setting to examine this. Unlike most other psychiatric syndromes, PTSD symptoms begin after a specific etiologic event. This makes it possible to more clearly follow the onset and course of symptoms.

Using advances over most prior studies with prospective assessments of children's PTSD symptoms and multi-method assessment of parenting constructs, including observational measures, these findings did not support a moderating effect of parental factors. That is, children's PTSD symptoms from T1 to T2 did not take different paths depending on the level of any parental factor.

Conflicting support was found for the Compound Effect (mediation) model (Scheeringa and Zeanah, 2001). When the mediator was maternal symptoms (either PTSD or depression) or T2 self-report escape/avoidance, the mediated effect was significant and in the expected direction. However, none of these parental factors involved measures of actual parenting behaviors. Only one of the five measures of actual parenting (T2 perceived emotional sensitivity measured with the PIPS interview) showed a significant mediated effect, but, contrary to expectations, greater perceived emotional sensitivity accounted for more, not fewer, T2 child PTSD symptoms. This means that the effect of children's greater PTSD symptoms at T2 may be significantly accounted for by mothers' greater emotional sensitivity at T2. Under the theoretical assumption of a causal mediation model, an inference could be that mother's greater emotional sensitivity at T2 caused children's greater PTSD symptoms at T2. This study however did not have a controlled design that could prove such an extraordinary causal claim, so an alternative inference is that mothers' greater perceived emotional sensitivity and children's greater PTSD symptoms co-occur at T2 for reasons about which one can only speculate. That is, the co-occurrence of mothers' greater perceived ES and children's greater PTSD symptoms T2 could be a correlation due to other reasons and not mediation or causality.

The direction of this finding is consistent with a growing number of other surprising empirical findings from prior studies. For example, abused mothers unexpectedly rated themselves as more effective parents (Levendosky et al., 2003), and better family adaptability unexpectedly associated with lower social competence and more externalizing problems (Cohen & Mannarino, 1996). These findings challenge traditional notions about maternal sensitivity. While one could view these findings as possible measurement errors or flaws of study design, it would seem prudent for researchers to view these findings open-mindedly and approach the measurement and role of parenting impartially in future studies.

A strength of this study was the use of multiple methods to measure maternal parenting behaviors. These included three measures of emotional sensitivity, which did not significantly positively correlate with each other. This suggests that emotional sensitivity is not a unitary construct that is manifest at continuous and stable levels across different types of situations, and indicates the complexity of measuring this construct. Each measure of emotional sensitivity appeared to tap into different components of parental warmth and sensitivity. The skill of interacting warmly with children in a structured laboratory puzzle task is apparently not the same skill as being able to talk warmly about children or the skill of managing distressed children at home. This may explain to some degree the contradictory results in previous studies.

Lastly, why were parental symptoms (PTSD and depression) or a general caregiver coping strategy (escape avoidance) significant as mediators while all but one measure of actual parenting behaviors were not? And the one measure of actual parenting behavior that was a significant mediator appeared to act opposite of the expected direction, i.e., higher perceived emotional sensitivity led to increased children's PTSD symptoms? One possibility is that children impacted their parents more than parents impacted children. The significant correlation that was found between T1 child PTSD symptoms and T1 observed emotional sensitivity ($r = 0.36$) may have been due to children's effects on parents, rather than parental effects on children, as previous researchers have speculated (Koplewicz et al., 2002). This interpretation would be in line with considerable speculation and empirical support for bidirectional effects between parent-child dyads (Crockenberg & Leerkes, 2000; Kuppens, Grietens, Onghena, & Michiels, 2009; Neece, Green, & Baker, 2012). If a bidirectional effect was operating, it would make it difficult or impossible to detect any mediating effect of parents on children.

In prior studies, both Laor et al. (1997) and Koplewicz et al. (2002) showed significant relations between child and parent PTSD symptoms distal to but not proximal to the traumas. Koplewicz and colleagues interpreted their temporally distal association as due to parents' reactions to their children's persisting distress, and explicitly rejected an interpretation that parents' persisting distress led to children's persisting distress. They based this on the fact that children's Time 1 and Time 2 severity of distress were far better predictors of parents' Time 2 distress than was the parents' own Time 1 distress. In our study, we found a similar pattern. T2 self-report emotional sensitivity was strongly correlated with T2 child PTSD ($r = 0.68$), but much less strongly related to T1 parental PTSD ($r = 0.26$) and depression ($r = 0.33$). These data would be consistent with a theory that parenting behavior was effected by children's symptoms more strongly than by parental symptoms.

A second possibility is that there are neither large parental effects on children nor child effects on parents nor methodological flaws in measuring observed parenting. Scheeringa and Zeanah (2001) postulated an additional possibility that if parents carry genetic susceptibility to develop PTSD, they pass those genes on to their children. Children with severe PTSD symptoms will have parents with severe PTSD symptoms due largely to shared genetic susceptibilities. Studies have shown that PTSD is approximately 30% heritable

according to twin and family studies (Afifi, Asmundson, Taylor, & Jang., 2010; Koenen, 2007).

Limitations of this study include that symptoms and parenting behaviors of fathers were not measured, however, the vast majority of children did not have biological fathers in the homes. The absence of fathers in most of the homes may have altered the mother-child dyadic interactions, although it seems more likely that this would have strengthened the impact of the mothers rather than lessened it. Also, this study did not analyze change in parenting behaviors or change in parental symptoms. A more rigorous test of mediation would require a study design that measured the actual change in the mediator and the sequential effect of the mediator causing changes in the outcome (Kraemer et al., 2002). There are other factors that may impact the course of PTSD symptoms, such as perceptions of the events, severity, and attachment status that this study was not able to examine. It is possible that measurement error by raters of the observational measures could have introduced bias, although the raters were trained to reliability with expert trainers. The sample size was small, however the tests that were conducted were within the estimated sample sizes needed for adequate power for medium and large effects. In order to recruit a sufficient size sample of very young children who experienced trauma, it was necessary to recruit from multiple sources for children who experienced different types of traumas. These different types of traumas, and any associated differences in demographics, could not be tested in subgroups because of the sample size.

While these are substantial limitations, these findings ought to be viewed in the context of this being only the third known study to formally test moderation or mediation models using observed parenting in relation to children's PTSD symptoms as the outcome (Feldman & Vengrober, 2011; Gewirtz et al., 2011). Most prior studies that used observed parenting variables used non-trauma-related and/or broader indices as the children's outcomes (e.g., Levendosky et al., 2003; Schechter et al., 2010). It is also a perceived advantage that this sample consisted of very young children, which is an age when parental influences ought to be stronger. The fact that these were found in a two-year prospective design provides some strength to the findings, as most prior studies analyzed cross-sectional data that were all concurrently collected. A final limitation is that more complicated moderation and mediation models could not be tested, such as gene x environment and differential susceptibility models (Belsky & de Haan, 2011).

The clinical significance of these findings is that caution is recommended in assuming that caregiver insensitivity is associated with more severe children's PTSD. Treatment strategies that focus on children's PTSD symptoms directly may be more efficacious compared to strategies that are based on the speculation that improvements in maternal sensitivity will translate into improved children's PTSD symptoms. This study was not a treatment study however, and clinical experience and other evidence (Lieberman, Ippen, & Van Horn, 2006) suggest that, at least in select cases, intervention at the relational level may be beneficial. While the co-occurring severity of symptoms in children and caregivers following traumatic events has been a robust finding, future research and clinical work ought to remain open to alternative explanations that this co-occurrence may be due to shared genetic vulnerabilities or to bidirectional dyadic influences.

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Table 1

Means of Model Variables.

Variable	n	M	SD
T1			
Child PTSD symptoms	62	3.3	2.6
Observed ES	61	4.3	1.0
Observed Discipline	59	4.4	0.7
Maternal PTSD symptoms	59	50.1	34.7
Maternal depression	60	12.4	10.9
T2			
Observed ES	35	9.0	1.2
Perceived ES	35	25.5	17.0
Self-report escape/avoidance	34	7.6	5.0
Child PTSD symptoms	35	3.3	3.2

PTSD = posttraumatic stress disorder. ES = emotional sensitivity.

Table 2

Correlation Matrix of Model Variables.

	1	2	3	4	5	6	7	8	9
1. T1 child PTSD	1.0								
2. T1 Observed ES	0.36*	1.0							
3. T1 Observed D	0.27*	0.50*	1.0						
4. T1 maternal PTSD	0.29*	0.11	0.22	1.0					
5. T1 maternal depression	0.36*	0.06	0.1	0.80*	1.0				
6. T2 Observed ES	0.04	0.19	0.33	-0.24	-0.25	1.0			
7. T2 Perceived ES	0.31	-0.05	-0.24	.26	0.33	-0.62*	1.0		
8. T2 Self-report EA	0.28	-0.16	-0.14	0.40*	0.49*	-0.39*	0.53*	1.0	
9. T2 Child PTSD	0.62*	0.15	0.08	0.60*	0.53*	-0.26	0.68*	0.48*	1.0

* p<.05.

PTSD = posttraumatic stress disorder. ES = emotional sensitivity. D = discipline. EA = escape/avoidance.

Table 3

Tests of Mediation.

Predictor	Mediator	BCBM 95% CI
T1 child PTSD	T1 Observed ES	(-0.056, 0.164)
	T1 Observed Discipline	(-0.266, .028)
	T1 maternal PTSD	(0.106, 0.455)
	T1 maternal depression	(0.029, 0.443)
	T2 Observed ES	(-0.141, 0.075)
	T2 Perceived ES	(0.014, 0.470)
	T2 Self-Report EA	(.001, 0.305)

Note: BCBM 95% CI = bias-corrected bootstrap method 95% confidence interval. T1 = time 1. T2 = time 2. PTSD = posttraumatic stress disorder. ES = emotional sensitivity. EA = escape/avoidance.