A Prospective Study on the Association Between Caregiver Psychological Symptomatology and Symptom Clusters of Pediatric Posttraumatic Stress Disorder

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This study investigated the influence of caregiver psychological symptoms on posttraumatic stress disorder (PTSD) symptoms in traumatized children. One-hundred eleven children and caretakers were assessed in this study. Children \( (N = 59) \) with a history of exposure to interpersonal violence were evaluated for reexperiencing, avoidance/numbing, and hyperarousal symptom clusters using the Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA). The 52 primary caregivers were evaluated using the Symptom Checklist-90-Revised (SCL-90-R) on 9 domains of psychological symptomatology: anxiety, depression, hostility, interpersonal sensitivity, obsessive–compulsive disorder, paranoid ideation, phobic anxiety, psychoticism, and somatization. At 14-month follow-up, 45 of the children were re-evaluated with the CAPS-CA. Caregiver psychological symptoms in the domains of anxiety, depression, interpersonal sensitivity, obsessive–compulsive disorder, and paranoid ideation were associated with less improvement in total pediatric PTSD symptoms. Analysis of PTSD symptoms by cluster showed that greater caregiver symptomatology in the domains of anxiety, depression, interpersonal sensitivity, and obsessive–compulsive disorder were associated with less improvement in the hyperarousal symptom cluster. These results suggest caregiver symptomatology may be specifically associated with hyperarousal symptoms in pediatric trauma.

Epidemiological studies indicate between 15% and 43% of children experience at least one childhood traumatic event, but only 1% to 6% are diagnosed with posttraumatic stress disorder (PTSD; Cuffe et al., 1998, Giaconia et al., 1995). The developmental course between trauma and psychological symptoms suggests a pathway moderated by risk and protective factors, but such factors remain poorly understood (Bryant, Salmon, Sinclair, & Davidson, 2007; Le Brocque, Hendricks, & Kenardy, 2010). Caregivers may play a critical role influencing children’s developmental trajectories. Studies investigating the role of the caregiver's mental health in pediatric posttraumatic stress symptoms (PTSS), however, have demonstrated mixed results.

Studies have shown an inconsistent association between caregiver’s traumatic stress symptomatology and child PTSS. In longitudinal studies of pediatric physical injury, parents’ PTSS, especially avoidance symptoms, correlated with children’s PTSS both at baseline and at weeks to months later (Daviss et al., 2000; Ostrowski, Christopher, & Delahanty, 2007; Ostrowski et al., 2011). Similarly, in a cross-sectional analysis 30 months after exposure to war trauma, Laor and colleagues (1997) found that maternal avoidance symptoms were associated with child PTSS. At 5-year follow-up, however, this association was no longer significant (Laor, Wolmer, & Cohen, 2001). Other studies of pediatric trauma suggest a more equivocal relationship between caregiver and pediatric traumatic stress symptoms, including longitudinal studies of traffic-injured children (Bryant, Mayou, Wiggs, Ehlers, & Stores, 2007), families exposed to a disasters (Koplewicz et al., 2002), children following a potentially traumatic event (Valentino, Berkowitz, & Stove, 2010), and children in the intensive care unit (Stowman, Keaney, & Daphtry, 2011).

These inconsistent results regarding the impact of caregivers on pediatric PTSS extends to research utilizing broader definitions of caregiver psychological functioning. Meiser-Stedman, Yule, Dalgleish, Smith, and Glucksman (2006) showed that parental depression and their endorsement of worry as a positive strategy were associated with pediatric PTSS 6 months
after pediatric trauma, although rumination and anxiety sensitivity were not associated. Green and colleagues (1991) found that the severity of maternal psychopathology, but not paternal, was associated with pediatric PTSS 2 years after a disaster. Schreier, Ladakakos, Morabito, Chapman, and Knudson (2005) found that families rated as highly expressive and with high achievement orientation had children with less severe PTSS after physical trauma, but no association was seen with other family variables of cohesion, conflict, or intellectual–cultural orientation. Similarly, Laor and colleagues (1997) found no association between family cohesion and adaptability and child PTSS 2 years after pediatric trauma.

Possible explanations for the inconsistent findings include variability in who is reporting the child’s symptoms. Although certain studies evaluate pediatric PTSS using parent report (e.g., De Vries et al., 1999), the agreement of parents with their children’s ratings continues to be low. Parental distress can distort their assessment of their child’s symptoms (Kassam-Adams, Garcia-España, Miller, & Winston, 2006). In addition, the caregiver variables measured across studies vary significantly from discreet symptoms of distress to broad measures of familial environment.

Caregiver psychological functioning may differentially affect specific clusters of PTSD symptoms in children. The Diagnostic and Statistical Manual of Mental Disorders (4th ed., DSM-IV; American Psychiatric Association, 1994) defines three clusters of symptoms that comprise a diagnosis of PTSD: reexperiencing symptoms (Cluster B), avoidance/numbing symptoms (Cluster C), and hyperarousal symptoms (Cluster D). Although few studies have investigated the association between caregiver functioning and specific pediatric PTSD symptom clusters, the limited literature supports an association between hyperarousal symptoms and caregiver functioning. Rossman and Ho (2000) found that maternal availability and familial stressors including spousal aggression and neighborhood violence had a significant impact on pediatric hyperarousal symptoms. Smith, Perrin, Yule, and Rabe-Hesketh (2001) showed that maternal distress significantly correlated to hyperarousal symptoms as well as reexperiencing symptoms, but not avoidance/numbing symptoms. Finally, in a post hoc analysis, Laor and colleagues (2001) found that poor maternal psychological functioning, as measured by distress symptoms, insecure attachment, and immaturity defense styles, was associated with greater hyperarousal symptoms.

The purpose of the present pilot research was to investigate domains of caregiver psychological symptomatology that may be associated with change in pediatric PTSS clusters of reexperiencing, avoidance/numbing, and hyperarousal. We hypothesized that based on preliminary findings from the limited existing literature, and the observation that modulation of arousal in children requires the support of caregivers especially during times of distress (Bowlby, 1969), caregiver symptomatology would be preferentially associated with hyperarousal symptoms in traumatized children exposed to interpersonal violence.

**Method**

**Participants and Procedure**

The families were referred from local social services departments and mental health clinics after exposure to a traumatic event. Enrollment eligibility included children who (a) experienced a DSM-IV Criterion A stressor involving interpersonal violence (i.e., physical abuse, sexual abuse, and/or witnessing violence; American Psychiatric Association, 1994), (b) experienced exposure to trauma that had occurred more than 6 months prior to the evaluation, (c) had no known history of alcohol or drug abuse/dependence, and (d) were living in a currently safe and stable home environment without the offending perpetrator of trauma.

One-hundred eleven subjects participated in the study; 59 families fulfilled the criteria, with 59 children and 52 of their primary caretakers completing the initial assessment. Each child had at least one documented exposure to interpersonal violence, with a severity score of 12 or above on the PTSD Reaction Index (Pynoos et al., 1987). Most children experienced multiple traumatic events (64%), including witnessing violence (57%), separation and loss experienced with distress or horror (55%), physical abuse (41%), sexual abuse (15%), physical neglect (12%), and emotional abuse (7%). The most recent trauma was at least 6 months prior to study participation, with a range of 6 to 108 months. Sixty-nine percent of participants reported some form of intervention between the two evaluations. Of those who received interventions, 90% reported family or individual counseling and 41% reported being prescribed psychotropic medication. A procedure was in place to report any suspected ongoing maltreatment; however, no cases were identified.

The children participants consisted of 31 boys and 28 girls. The mean age of the children was 10.6 years (SD = 1.9) with a range of 7.1 to 14.1 years at initial assessment, and 11.6 years at follow-up. Sixty-three percent of the primary caregivers were biological parents, 24.5% were extended family members such as grandparents or aunts, and 12% were foster parents. The median family income was $30,000. The demographic data are presented in Table 1. Forty-five families, or 76% of those initially enrolled, were reassessed at follow-up approximately 12–18 months later (M = 14 months, SD = 2 months). The age of children who were lost to follow-up (M = 11.7 years) was significantly higher than those children who completed follow-up (M = 10.4 years; p = .475), but there were no other differences in demographics, PTSS, and caregiver symptomatology (p > .10).

The study was approved by the Stanford University Institutional Review Board. The child-participant’s assent and his or her guardian’s written consent were obtained. At intake, assessments on the nature of interpersonal violence, pediatric
Studies have demonstrated that the SCL-90-R subscales, most notably anxiety and depression, have good convergent and discriminate validity across different patients, as well as between patient and community populations (Koeter, 1992; Morgan, Wiederman, & Magnus, 1998). Cronbach’s α coefficient of the SCL-90-R subscales in our sample ranged from .78 to .92.

### Data Analysis

The relationship between initial caregiver psychological symptoms and the change in the children’s PTSS score was examined with correlations including the nine domains of initial caregiver symptoms across the change in three symptom clusters of pediatric PTSD, partialling out age and gender. To control for multiple comparisons, the Benjamini–Hochberg procedure was also used to assess the false discovery rate-adjusted (FDR-adj) significance of correlations across each PTSD symptom cluster (Benjamini & Hochberg, 1995). Based on a follow-up sample size of 45, α was set at < .05 for a one-tailed test, which has an 80% power to detect correlations of at least .36, which accounts for about 10% variance.

### Results

Among nine domains of caregiver psychological symptoms, caregivers reported the highest average scores for obsessive–compulsive and depression symptoms, and lowest scores on hostility (see Table 2). For the children’s PTSS scores, all three symptom cluster scores decreased from initial to follow-up assessment (see Table 2). Due to variation in both primary caregiver identity and the time between trauma and assessment, we conducted regression analyses controlling for primary caregiver and time since the most recent trauma reported; however, no effect of caregiver and time since the trauma was found on the PTSS scores. None of the families reported traumatic events including exposure to interpersonal violence between initial and follow-up assessment.

None of the nine domains of caregiver symptomatology were significantly correlated with initial PTSS total and cluster scores. Correlations to the change in pediatric PTSS score (Time 2–Time 1), however, demonstrated that higher scores on five of the nine domains of caregiver symptomatology was associated with less decrease in total PTSS score over time: anxiety, depression, interpersonal sensitivity, obsessive–compulsive symptoms, and paranoid ideation (see Table 3). Higher scores on the same five domains of caregiver symptomatology were associated with less decrease in Cluster D symptom scores. The correlations remained significant when partialling out for age and gender. When controlling for the FDR across each PTSD symptom cluster, however, only four of the five domains of caregiver symptomatology remain significantly correlated to change in hyperarousal: anxiety, depression, interpersonal sensitivity, and obsessive–compulsive symptoms (FDR-adj p value, or p < .05), while paranoid ideation was no longer
Table 2
Descriptive Statistics of Pediatric PTSD Symptoms and Caregiver Psychological Symptomatology

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Mdn</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 PTSS total</td>
<td>59</td>
<td>36.95</td>
<td>19.95</td>
<td>35.00</td>
</tr>
<tr>
<td>T1 Cluster B</td>
<td>59</td>
<td>10.12</td>
<td>7.64</td>
<td>8.00</td>
</tr>
<tr>
<td>T1 Cluster C</td>
<td>59</td>
<td>15.14</td>
<td>9.30</td>
<td>13.00</td>
</tr>
<tr>
<td>T2 PTSS</td>
<td>45</td>
<td>27.22</td>
<td>18.38</td>
<td>21.50</td>
</tr>
<tr>
<td>T2 Cluster B</td>
<td>45</td>
<td>7.30</td>
<td>6.78</td>
<td>5.00</td>
</tr>
<tr>
<td>T2 Cluster C</td>
<td>45</td>
<td>11.65</td>
<td>7.83</td>
<td>10.50</td>
</tr>
<tr>
<td>T2 Cluster D</td>
<td>45</td>
<td>8.26</td>
<td>7.38</td>
<td>7.50</td>
</tr>
</tbody>
</table>

Anxiety 52 53.85 14.48 56.00
Depression 52 57.81 14.00 57.00
Hostility 52 53.57 14.05 49.00
Interpersonal sensitivity 52 54.07 15.25 55.00
Obsessive–compulsive 52 58.62 13.67 60.00
Paranoid ideation 52 56.77 13.71 57.00
Phobic anxiety 52 54.26 12.17 54.00
Psychoticism 52 55.72 13.95 58.00
Somatization 52 56.28 12.28 60.00

Note. PTSD = posttraumatic stress disorder; PTSS = posttraumatic stress symptoms; T1 = Time 1; T2 = Time 2. For the nine domains of caregiver psychological symptoms based on the Symptom Checklist-90-Revised, a T score of 55 and 59 corresponds to approximately the 70th and 80th percentiles, respectively, based on nonpatient adult norms.

Discussion
The present study examined the longitudinal impact of caregiver psychological symptomatology on PTSD symptom clusters among 7- to 14-year-old children with a history of exposure to interpersonal violence. The findings demonstrated that several domains of caregiver symptoms, including symptoms of depression, anxiety, obsessive–compulsive disorder, and interpersonal sensitivity, were associated with less improvement of PTSS in the children and more specifically, Cluster D hyperarousal symptoms over a 14-month follow-up. Although shared biological predisposition and exposure to trauma may play a role in the interaction between caregiver symptomatology and pediatric PTSS, the lack of a significant correlation at the initial assessment of our study suggests that caregiver symptoms may influence the trajectory of PTSS over time. Multiple studies have shown that caregiver psychological functioning can impact pediatric PTSS, but findings from the literature have not been consistent. This study suggests two possible reasons: (a) only certain domains of caregiver psychological symptoms influence the developmental course of PTSS, and (b) the impact of caregivers on the developmental course of PTSS may be specific to the hyperarousal symptom cluster.

The domains of caregiver symptomatology found to be associated with change in pediatric PTSS included symptoms of anxiety and obsessive–compulsive disorder. Symptoms of interpersonal sensitivity, as measured by the SCL-90-R, have significantly correlated ($q > .05$). The other four domains of caregiver symptomatology, including hostility, phobic anxiety, psychoticism, and somatization were not significantly associated with change in total PTSS or Cluster D symptom scores. None of the nine domains of caregiver symptomatology were significantly associated with change in Cluster B or Cluster C symptom scores.

Table 3
Correlations Between Pediatric PTSD Symptoms and Caregiver Psychological Symptoms

<table>
<thead>
<tr>
<th>Child symptoms</th>
<th>ANX</th>
<th>DEP</th>
<th>HOS</th>
<th>INT</th>
<th>OBS</th>
<th>PAR</th>
<th>PHO</th>
<th>PSY</th>
<th>SOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 Total PTSS</td>
<td>.15</td>
<td>.02</td>
<td>.01</td>
<td>-.05</td>
<td>.13</td>
<td>.06</td>
<td>-.08</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td>Time 1 Cluster B</td>
<td>.11</td>
<td>-.03</td>
<td>-.02</td>
<td>.00</td>
<td>.06</td>
<td>.09</td>
<td>.03</td>
<td>.01</td>
<td>-.04</td>
</tr>
<tr>
<td>Time 1 Cluster C</td>
<td>.21</td>
<td>.11</td>
<td>.12</td>
<td>.02</td>
<td>.18</td>
<td>.11</td>
<td>-.05</td>
<td>.08</td>
<td>-.05</td>
</tr>
<tr>
<td>Time 1 Cluster D</td>
<td>.02</td>
<td>-.11</td>
<td>-.11</td>
<td>-.13</td>
<td>.03</td>
<td>-.07</td>
<td>-.18</td>
<td>.06</td>
<td>.05</td>
</tr>
<tr>
<td>Total PTSS change$^a$</td>
<td>.30</td>
<td>.29</td>
<td>.17</td>
<td>.29</td>
<td>.30</td>
<td>.30</td>
<td>.16</td>
<td>.27</td>
<td>.22</td>
</tr>
<tr>
<td>Cluster B change</td>
<td>.02</td>
<td>.06</td>
<td>.08</td>
<td>-.04</td>
<td>.04</td>
<td>-.08</td>
<td>-.08</td>
<td>.07</td>
<td>.00</td>
</tr>
<tr>
<td>Cluster C change</td>
<td>-.04</td>
<td>.04</td>
<td>.05</td>
<td>.15</td>
<td>.09</td>
<td>.08</td>
<td>.15</td>
<td>.12</td>
<td>.08</td>
</tr>
<tr>
<td>Cluster D change</td>
<td>.39$^*$</td>
<td>.38$^*$</td>
<td>.21</td>
<td>.36$^*$</td>
<td>.35$^*$</td>
<td>.32</td>
<td>.23</td>
<td>.23</td>
<td>.21</td>
</tr>
</tbody>
</table>

Note. PTSD = posttraumatic stress disorder; ANX = anxiety; DEP = depression; HOS = hostility; INT = interpersonal sensitivity; OBS = obsessive–compulsive; PAR = paranoid ideation; PHO = phobic anxiety; PSY = psychoticism; SOM = somatization; PTSS = posttraumatic stress symptoms.

$^a$Change = Time 2–Time 1.

$^*$False discovery rate-adjusted p-value, or $q < .05$, one-tailed.

been associated with feelings of personal inadequacy and interpersonal dysfunction (Derogatis, Rickels, & Rock, 1976; Karterud et al., 1995; Pedersen & Karterud, 2010). This may relate to less psychosocial resources and availability to support a child’s adaptive processing of the trauma, such as modulating distress and facilitating expression of feelings (Lepore, Silver, Wortman, & Wayment, 1996; Schreier et al., 2005; Schwartz, Dohrenwend, & Levav, 1994). Furthermore, these caregiver symptom domains may be associated with maladaptive coping behaviors and cognitions, including rumination, worry, and fearful beliefs—behaviors and cognitions that may be modeled by children and negatively influence the development course of PTSS (Field, Argyris, & Knowles, 2001; Meiser-Stedman, Dalgleish, Glucksman, Yule, & Smith, 2009).

Another explanation for the inconsistent relationship between caregiver symptomatology and pediatric PTSS described in the literature is that certain symptoms of PTSD may be preferentially influenced by caregiver symptomatology. Our study found that the domains of caregiver symptoms associated with less improvement in total PTSS, were also associated with less improvement in Cluster D hyperarousal symptoms, but not re-experiencing and avoidance/numbing symptom clusters. Cluster D assesses symptoms of hyperarousability that include sleep disturbances, irritability, anger, difficulty with concentration, hypervigilance, and exaggerated startle responses. Such behavioral and cognitive symptoms may reflect the poor modulation of arousal of children who rely on the support of caregivers in situations of distress (Bowlby, 1969). Indeed, other studies have shown an association between pediatric hyperarousal symptoms and maternal psychological functioning, maternal availability, maternal distress, and familial stressors including spousal aggression and neighbourhood violence (Laor et al., 2001; Rossman & Ho, 2000; Smith et al., 2001).

Hyperarousal symptoms after trauma may play an important role in the development of PTSD. In two studies of adult injury, initial hyperarousal had a strong impact on re-experiencing, avoidance, and emotional numbing at subsequent time points, emerging as the best cross-wave predictor of nearly every symptom cluster (Marshall, Schell, Glynn, & Shetty, 2006; Schell, Marshall, & Jaycox, 2004). In pediatric studies, hyperarousal symptoms predicted emotional numbing at follow-up (Nugent, Christopher, & Delahanty, 2006; Weems, Saltzman, Reiss, & Carrion, 2003). Severe hyperarousal symptoms were also associated with reductions in hippocampal volume and fine motor-skill deficits among traumatized children (Carrion, Weems, & Reiss, 2007; De Bellis, Hopper, Spratt, & Woolley, 2009), suggesting a role of hyperarousability on the physiological development of traumatized youth.

This investigation is not without limitations that are important to highlight. First, the small sample size limits the statistical power to detect significance when correcting for multiple correlations. When using the Benjamini–Hochberg procedure for FDR, to control for multiple comparisons across each PTSD symptom cluster, only four of the five domains of caregiver symptomatology remain significantly correlated to change in hyperarousal. When controlling for all measurements made in the study, no correlations met the Benjamini–Hochberg adjusted threshold for significance. In this context of limited sample size and thus power, the results generated from this pilot study should be viewed only as preliminary and necessitating replication. Furthermore, although statistically significant, the effect size of caregiver psychopathology influencing pediatric hyperarousal symptoms in our study must be interpreted as clinically small, as correlations of .30 account for less than 10% of the total variability.

Another limitation is the heterogeneity within the trauma definition of interpersonal violence, such as duration and number of traumas (i.e., children with both chronic stress and single traumatic incidents), trauma perpetrator (i.e., first-degree relative and strangers), and the wide time frame since the most recent trauma. Future replication of our findings in larger samples with more circumscribed traumatic experiences is needed. Furthermore, although the longitudinal nature of the study suggests a direction of the association, the design of the study does not preclude the possibility of other variables mediating the association between caregiver psychological symptoms and the child’s hyperarousability. Given our small sample, we were unable to examine many potential variables that may be associated with caregiver symptomatology and PTSD symptom development. A final shortcoming of this study was the fairly large dropout rate, with 14 children lost to follow-up (24%). These dropouts, who were found to be older than the group completing the study, substantially decreased the total number of subjects who completed the study, which in turn limited the power of the data analyses, and precluded our ability to analyze the influence of age on the association between of caregiver symptoms and pediatric PTSS.

Given the substantial burden of interpersonal violence in many communities (Burke, Hellman, Weems, & Carrion, 2011), developmental research plays an important role in identifying and implementing interventions to promote resilience among traumatized children. Our study suggests that assessing hyperarousability and caregiver functioning may help identify children at risk of experiencing prolonged posttraumatic distress. Early targeting of hyperarousal symptoms and addressing dysregulation of the caregiver–child dyad in therapy may hold promise for forestalling a negative trajectory in the developmental course of PTSS. Continued research will help to inform effective clinical approaches in pediatric trauma and support adaptive regulation of stress in the context of childhood adversity.

References


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