DEVELOPMENT OF CHILD POSTTRAUMATIC STRESS DISORDER IN PEDIATRIC TRAUMA VICTIMS: THE IMPACT OF INITIAL CHILD AND CAREGIVER PTSD SYMPTOMS ON THE DEVELOPMENT OF SUBSEQUENT CHILD PTSD

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CHAPTER 1

INTRODUCTION

Posttraumatic stress disorder (PTSD) in injured children represents a serious public health concern, with reported rates of PTSD due to pediatric injury ranging from 5-15% (Landolt, Vollrath, Ribi, Gnehm, & Sennhauser, 2003). Childhood PTSD can have severe, long-lasting consequences on child development. For instance, childhood PTSD has been related to social impairments (Berman, Kurtines, Silverman, & Serafina, 1996), cognitive deficits (Bremner et al., 1995), and numerous additional trauma-related problems such as depression and behavioral disturbances (Fletcher, 1996). A number of demographic (child’s age, gender, socioeconomic status) and event-related (trauma severity, injury severity) variables have been implicated as risk factors for child PTSD (Barakat et al., 1997; Foy, Madvig, Pynoos, & Camilleri, 1996; Fletcher, 1996; Pelcovitz et al., 1998). One variable that has been consistently found to impact child responses to trauma is the manner in which the child’s parents (typically the mother) react to the event (McFarlane, 1987; Smith, Perrin, Yule, & Rabe-Hesketh, 2001). Research has found that 24% to 71% of parents report their own posttraumatic stress symptoms (PTSS) following their child’s traumatic event (Landolt et al., 2003; Stuber, Christakis, Houskamp, & Kazak, 1996). Oftentimes, rates of parental PTSD are greater than rates of child PTSD (Landolt et al., 2003). Parental PTSS may affect one’s parenting styles and the child’s
ability to cope with the trauma. However, relatively few studies (Best, Streisand, Catania, & Kazak, 2001; Bryant, Mayou, Wiggs Ehlers, & Stores, 2004; Koplewicz et al., 2002; McFarlane, 1987; Ostrowski, Christopher, & Delahanty, 2007a) have examined the extent to which parent and child responses may interact to impact child post-traumatic adjustment. Furthermore, these studies often relied on parent report of child symptoms (deVries et al., 1999; McFarlane, 1987), which may be biased due to the parent’s own distress (Boyle & Pickles, 1997; Landolt et al., 2003; Smith et al., 2001). The present study was designed to prospectively examine the development of child distress following pediatric injury. Moreover, the impact of caregiver distress and the relationship between parent and child distress were examined as predictors of persistent child PTSD.

Posttraumatic Stress Disorder in Child Trauma Victims

Posttraumatic stress disorder first appeared as a diagnosable disorder in the DSM-III (American Psychiatric Association, 1980). Currently, DSM-IV-TR (American Psychiatric Association, 2000) criteria stipulate that a person must experience or witness an event involving actual or perceived life threat, and they must respond with intense fear, helplessness, or horror (Criterion A). In addition, the victim must endorse symptoms belonging to 3 symptom clusters (American Psychiatric Association, 2000). The first symptom cluster (Criterion B) involves re-experiencing symptoms such as intrusive memories, nightmares, and psychological and/or physiological distress when reminded of the trauma. The second cluster (Criterion C) includes avoidance symptoms such as persistent avoidance of thoughts, feelings, and reminders of the trauma, inability
to recall aspects of the traumatic event, withdrawal from others and normal activities, and symptoms of emotional numbing. The final symptom cluster (Criterion D) involves the experience of hyperarousal symptoms such as insomnia, irritability, difficulty concentrating, hypervigilance, or heightened startle response (American Psychiatric Association, 2000). In order to meet full diagnostic criteria, trauma victims must endorse at least 1 re-experiencing symptom, 3 avoidance symptoms, and 2 hyperarousal symptoms. These symptoms must be present for at least 1 month (Criteria E) and cause clinically significant distress or impairment in one’s social, occupational, and/or other important areas of functioning (Criteria F). While the diagnostic criteria for adult and child trauma victims are the same, symptoms of PTSD may differ between adults and children (Carrion et al., 2002; Scheeringa et al., 1995). For instance, children are less likely to experience flashbacks (Terr et al., 1999) and may relive the trauma through behavioral reenactments of the traumatic event (e.g., play; Terr et al., 1983).

Children are approximately 1.5 times more likely to develop PTSD than are similarly traumatized adults (Fletcher, 1996). Traumatized children also tend to experience more trauma-related problems such as depression, separation anxiety, lowered self-esteem, aggression, and substance abuse when compared to similarly traumatized adults (Fletcher, 1996). In addition to psychosocial consequences of trauma, children with chronic PTSD appear to have a number of biological abnormalities, including altered levels of catecholamines and cortisol (Carrion et al., 2002; DeBellis et al., 1999a; Lemieux & Coe, 1995). Stressful events may also impact a child’s developing brain, which may leave the child vulnerable to maladaptive post-traumatic
responses upon exposure to a subsequent stressor (DeBellis et al., 1999b). The negative biological and psychosocial consequences of childhood PTSD underscore the importance of early identification of child trauma victims at risk for the development of PTSD.

*Development of Childhood Post-traumatic Distress*

Different theoretical models propose discrete and oftentimes contradictory patterns of symptom development following a traumatic event. Behavioral and cognitive theories of PTSD hypothesize that distressing intrusive thoughts (i.e., re-experiencing symptoms) are primary among PTSD symptoms and that PTSD symptoms are maintained via a cyclic interaction between intrusive thoughts and avoidance (Foa, Stekette, & Rothbaum, 1989). Horowitz (1979) proposed that intrusive post-traumatic cognitions are a common, predictable response to a traumatic event. However, one’s emotional processing of their traumatic event is intensified by uncontrollable, intrusive thoughts and images (Foa & Hearst-Ikeda, 1996; Horowitz, 1986). These painful cognitions can cause trauma victims to avoid traumatic thoughts, images, and traumatic cues. As such, one may experience an oscillation between intrusive and avoidant states (Horowitz, 1979). Avoidance can elicit temporary relief from one’s distress; however, if used excessively, avoidance can impair one’s emotional processing of traumatic memories, thereby leading to an exacerbation of PTSD symptoms (Hayes et al., 1996; Horowitz, 1986; Steil & Ehlers, 2000). Research has found that avoidance symptoms account for a significant portion of the variance in subsequent PTSD symptomatology.
suggesting that avoidance plays a pivotal role in the development and maintenance of persistent PTSS (Plumb, Orsillo, & Luterek, 2004).

Conversely, other researchers emphasize the importance of early hyperarousal symptoms in driving the development of PTSD and other PTSD symptoms (Schnell et al., 2004). Symptoms of hyperarousal may interfere with one’s emotional processing of the traumatic event, and lead to the development of other PTSS (Brewin, 2000; Ehlers & Clark, 2000). Biological studies of PTSD have suggested that physiological hyperarousal, such as elevated heart rate and catecholamine levels, soon after a trauma is associated with increased risk for PTSD in adults (Bryant, Harvey, Guthrie, & Moulds, 2000; Shalev et al., 1998) and children (Nugent, Christopher, Delahanty, 2006; Winston et al., 2003). Researchers have theorized that acute psychophysiological responses following a traumatic event may impact one’s memory formation by causing an over-consolidation of traumatic memories. Consequently, overconsolidated memories may manifest themselves as intrusive thoughts, and lead to the development and persistence of post-traumatic distress (Pitman, 1989).

A longitudinal study examining the course of PTSS in adult trauma survivors suggested that those trauma victims who reported hyperarousal as the most prominent baseline symptom (within days of hospital admission), showed increased impairment compared to other trauma victims (Schell et al., 2004). Hyperarousal symptoms were also found to be the best predictor of subsequent symptom severity and overall distress. Furthermore, hyperarousal influenced other PTSS but was generally not influenced by other symptom clusters (Schell et al., 2004). It is unclear whether the same patterns
observed in adults would be present in children (Meiser-Stedman et al., 2005), and no studies have examined the extent to which initial hyperarousal symptoms in a caregiver might impact adjustment of a child trauma victim.

Prospective, longitudinal studies that assess traumatic responses over an extended time period are crucial to understand the developmental course of childhood PTSD. Specific PTSD symptom clusters (i.e., hyperarousal, re-experiencing, and avoidance) need to be assessed separately as each symptom cluster may have a differential impact on child adjustment over time. Moreover, the relative contribution of specific PTSS may be greater in the acute aftermath of a traumatic event as opposed to later when persistent PTSD symptoms have been established. Models of PTSD that have examined both intrapersonal (e.g., subjective distress, coping mechanisms) and interpersonal (e.g., social support) variables in predicting child PTSD only explain approximately 50% of the variance in child PTSD (Vernberg, LaGreca, Silverman, & Prinstein, 1996). As such, other variables such as the impact of parental responses on the child’s reactions may help explain additional variance.

*Parental PTSS following a Child’s Trauma*

Parents are often traumatized by their child’s traumatic event either through direct exposure to the child’s trauma (i.e., witnessing or being involved in the trauma), having to deal with the child’s post-traumatic distress, or their own feelings of guilt and hopelessness (Landolt et al., 2003). Factors that increase parental risk for developing PTSD include increased number of prior hospitalizations of the child, younger age of the
child, increased functional impairment of the child, and direct parental exposure to the trauma (i.e., a car accident in which both the parent and child were in the vehicle: deVries et al., 1999; Smith et al., 2001). Furthermore, factors such as living in an incomplete family and a greater number of prior negative life events have been associated with increased maternal distress following a child’s trauma (Brewin, Andrews, & Valentine, 2000; Landolt et al., 2003).

Research examining the concordance of parent and child PTSS following a child’s trauma have produced equivocal results, with some studies reporting a significant association between parent (particularly mother) and child PTSS (deVries et al., 1999; Smith et al., 2001), and others finding no significant relationship (Bryant et al. 2004; Koplewicz et al., 2002; Stuber et al., 1996). Inconsistent findings may be due to methodological differences between studies. For instance, studies that have examined parent and child dyads in which both were direct victims of the traumatic event have found a stronger relationship between parent and child PTSS than studies examining parents who were not direct victims (e.g., Barakat et al., 1997; deVries et al., 1999; Smith et al., 2001). Similarly, studies in which parents reported on both theirs and their child’s symptoms tend to find higher correlations than studies in which the child reported on his or her own symptoms (deVries et al., 1999; Smith et al., 2001). Parental reports of child symptomatology may be biased as research indicates that maternal distress may distort mothers’ interpretations of child distress (Boyle & Pickles, 1997; Smith et al., 2001). Differential findings concerning the concordance between parent and child PTSS could also be related to issues regarding timing of assessments (Pfefferbaum
& Pfefferbaum, 1998). Studies that have examined the relationship between acute parent and child PTSS (within 3 months post-trauma) have typically not found significant correlations (Bryant et al., 2004; Winston, Kassam-Adams, Garcia-Espana, Ittenbach, & Cnann, 2003), while studies examining more chronic PTSS have reported significant relationships (Koplewicz et al., 2002; Smith et al., 2001).

Although findings concerning the agreement between parent and child PTSS have been mixed, research has consistently found that parental distress following a traumatic event has a negative impact on child adjustment. The availability of a healthy, responsive caregiver who can mitigate the negative effects of stressful life events has been shown to predict child post-traumatic adjustment (Perry, Pollard, Blakley, Baker, & Vigilante, 1995). However, parental abilities can become compromised if a parent is under considerable distress or is depressed (for further review see Lovejoy, Graczyk, O’Hare, & Neuman, 2000).

*Interaction of Parent and Child PTSS*

The majority of studies conducted with child trauma victims have been done cross-sectionally making the examination of the interaction between caregiver and child post-traumatic distress difficult. Furthermore, researchers have typically examined the impact of overall parental PTSS on child PTSS (Barakat et al., 1997; McFarlane, 1987; Smith et al., 2001) and found that children had a more difficult time adjusting if their parents also suffered from PTSD (McFarlane, 1987; Smith et al., 2001). Although studies have suggested that parental PTSD may impact a child’s recovery post-trauma,
specific parental PTSS may differentially impact a child’s adjustment following a traumatic event. Research has found that the most common symptoms experienced by both parents and children following a child’s trauma are re-experiencing symptoms (Best et al., 2001; Kazak et al., 2004; Keppel-Benson, Ollendick, & Benson, 2002; Landolt et al., 2003). Caregiver re-experiencing symptoms, such as intrusions, may make it difficult for the caregiver to contain his/her and the child’s anxieties, which may intensify the child’s own intrusions. Although re-experiencing symptoms are the most commonly reported, other symptoms may convey greater risk of persistent child PTSS.

Parental hyperarousal symptoms, such as irritability and hypervigilance, may also be associated with increased child distress. A parent’s ability to contain their own anxiety can be a major determinant in the child’s own responses. The direct conveyance of the parent’s anxiety to the child may increase the child’s vulnerability to post-traumatic distress (McFarlane, 1987). Awareness of a parent’s distress may enhance the child’s own anxieties concerning the trauma and their own safety (McFarlane, 1987). Parental hypervigilance following a child’s traumatic event has been found to be associated with increased child PTSS (Keppel-Benson et al., 2002). Conversely, research has found that maternal avoidance can negatively impact a child’s posttraumatic adjustment, particularly in girls (Ostrowski et al., 2007a). Identification of parental symptoms that are particularly linked to risk for PTSD in a child will aid in early identification efforts and inform the development of appropriate intervention for child trauma victims.
Impact of Additional Variables in the Development of Child PTSD

Prior Psychopathology

Additional variables that may impact risk and development of child PTSS include prior trauma history, other comorbid disorders, and child gender. Research suggests that children with a history of mental illness preceding their traumatic event are at greater risk for developing PTSS (Udwin, Boyle, Yule, Bolton, O’Ryan, 2000). Furthermore, having a prior trauma history is also associated with increased risk for subsequent PTSD symptoms (Di Gallo, Barton, & Parry-Jones, 1997; Keppel-Benson et al., 2002; Mirza, Bhadrinath, Goodyer, & Gilmour, 1998; Stallard et al., 1998). A recent meta-analysis found prior trauma history to be one of the most consistent predictors of PTSD following exposure to a subsequent trauma (Ozer et al., 2003). Furthermore, prior trauma has been shown to be associated with altered stress hormone responses to subsequent stressors thereby increasing one’s risk of developing PTSD upon exposure to a subsequent stressor (Delahanty et al., 2003, 2005; Heim et al., 2000; Resnick et al., 1995). More specifically, adult trauma victims with a history of prior traumatic events have been found to have lower plasma cortisol levels (Resnick et al., 1995; Yehuda, Resnick, Schmeidler, Yang, & Pitman, 1998) and smaller hippocampal volumes and functional deficits (DeBellis et al., 1999).

However, biological studies of PTSD have produced puzzling findings; whereas, in adults, lower cortisol levels have been associated with greater subsequent PTSS, in children, higher cortisol has been related to higher subsequent PTSS. Researchers have
attempted to address this inconsistency by positing more developmental models of the disorder. For instance, DeBellis’ (2001) developmental traumatology model of PTSD suggests that a subset of child trauma victims may initially respond to a traumatic event with abnormally elevated levels of cortisol that, over time, may alter normal HPA axis functioning. This disruption may result in enhanced negative feedback inhibition of the HPA axis. Over time (probably years), enhanced negative feedback could result in lower levels of basal cortisol, possibly explaining some of the findings of lowered cortisol in adults with PTSD. In this case, low cortisol levels in adults may simply serve as a marker of risk afforded by prior traumatic experiences, rather than a causal role in the development of PTSD. Research in child trauma victims has supported DeBellis’ (2001) model, suggesting that initially and within 2 years post-trauma, PTSS are associated with higher levels of cortisol (DeBellis et al., 1999). However, studies examining child trauma victims after a longer duration of time since the trauma (e.g., 5 years) have found lower levels of cortisol to be associated with PTSS (Goenjian et al., 1996). We have previously examined the impact of prior trauma history on the biology of PTSD in children (Delahanty et al., 2005; Ostrowski et al., 2007b). In both studies higher in-hospital cortisol levels were associated with higher subsequent PTSS in children who did not have a trauma history. However, when children with a trauma history were included in the analyses, the relationships between cortisol and PTSS became nonsignificant, underscoring the importance of examining the role of prior trauma in biological studies of PTSD.
Prior trauma history may also act to increase one’s risk for post-traumatic distress through nonbiological means. Prior traumatic events may deplete one’s intrapersonal and interpersonal resources thereby potentially weakening their resistance to future stressful life events (Koopman et al., 1994). Consequently, repeated exposure to traumatic events may sensitize the individual to the negative effects of subsequent traumas and increase psychosocial impairment (Koopman et al., 1994; van der Kolk & Greenberg, 1987). As such, those individuals with a history of traumatic events may be more vulnerable to later stressors (Bremner & Vermetten, 2001; DeBellis, 2001; Teicher, Andersen, Polcan, Anderson & Navalta et al., 2003). Given the impact of prior trauma history, the present study examined the impact of prior trauma history in the development of child PTSD.

**PTSD and Depression**

Data from the National Comorbidity Survey found the comorbidity rates between all depressive disorders and PTSD to be higher than 50% (Kessler et al., 1995). The high rates of comorbidity between PTSD and depression may be due, in part, to the overlapping symptomatology between the two disorders (Franklin & Zimmerman, 2001; Keane, Taylor, & Penk, 1997; O’Donnell, Creamer, & Pattison, 2004). Emotional numbing symptoms of PTSD are grouped within the avoidance symptom cluster and consist of disinterest in activities, detachment from others, and a restricted range of emotional expressiveness. These emotional numbing symptoms have been found to be distinct from the other PTSD symptom clusters (i.e., reexperiencing, avoidance, and hyperarousal; Foa, Riggs, & Gershuny, 1995; King & King, 1994; Weathers & Litz,
Research has found that those individuals who endorse higher rates of emotional numbing symptoms are more likely to also be diagnosed with Major Depressive Disorder (MDD; Kashdan, Elhai, & Frueh, 2006). However, other researchers have found no association between MDD and emotional numbing symptoms suggesting that the emotional numbing symptoms cannot be the sole reason for the high rates of comorbidity between depression and PTSD (Litz, Schlenger, Weathers, Caddell, Fairbank, & LaVange, 1997). Furthermore, Glover (1992) hypothesized that emotional numbing symptoms differ from depressive symptoms in that emotional numbing involves the absence of feelings including depression and sadness. Depression has also been found to differ biologically from PTSD. For instance, patients diagnosed with MDD typically show nonsuppression of cortisol following administration of dexamethasone whereas patients with PTSD and MDD fail to show nonsuppression (Halbreich, Olympia, Glogowski, Carson, Axelrod, et al., 1988; Kosten, Wahby, Giller et al., 1990) or demonstrate hypersuppression (Yehuda, Southwick, Krystal, Bremner, Charney, & Mason, 1993). Prior research demonstrates high rates of comorbidity and symptom overlap between depression and PTSD. However, PTSD and depression have been found to differ in both psychological and physiological responses. The present study sought to further elucidate the specificity of in-hospital PTSD symptoms in predicting the development of subsequent PTSD in children.
Gender and PTSD

Male and female child trauma victims have been found to report varying rates of PTSS and are differentially impacted by parental distress. Similar to findings in adults (Brewin et al., 2000; Norris et al., 2002), girls appear to be more susceptible to PTSD than similarly traumatized boys. For instance, adolescent girls are 2-6 times more likely than adolescent males to develop PTSD following a traumatic event (Cuffe et al., 1998; Giaconia et al., 1995). Gender differences do not appear to be due to higher rates of exposure to traumatic events in females or differing types of trauma experienced by males versus females (Breslau et al., 1997; Fletcher, 1996; Kessler, Sonnega, Bromet, & Nelson, 1995; Smith et al., 2001; Stein, Walker, Hazen, & Forde, 1997; Tolin & Foa, 2006). A number of other possible explanations for the gender discrepancy have been posited. For instance, research suggests that girls use more maladaptive coping mechanisms, such as rumination, than boys (Causey & Dubow, 1992; Compas et al., 1993; Frydenberg & Lewis, 1993; Hampel & Petermann, 2005; Seiffge-Krenke, 1993). Following a traumatic event, women may be more likely to use emotion-focused coping styles, decreased emotional regulation, and seek out social support (Hampel & Petermann, 2005; Littlewood et al., 1991), whereas men appear to prefer more instrumental, problem-oriented coping styles (Keefe et al., 2000). These coping styles may cause females to be more vulnerable to internalizing disorders, such as depression and anxiety (Compas et al., 1993; Nolen-Hoeksema et al., 1991).

According to the social-cognitive perspective, an individual’s gender identity may be partially determined by the social meanings of being male and female and gender role
socialization (Baker et al., 2005; Saxe & Wolfe, 1999). Trauma-related cognitions, such as helplessness, may be more dissonant with men’s self-concepts, therefore men may be more motivated to alter their thoughts about the trauma to decrease this dissonance (Saxe & Wolfe, 1999). Accordingly, males may suppress PTSD symptom experiences and females may be more likely to disclose these distressing symptoms (Saxe & Wolfe, 1999; Wolfe & Kimerling, 1997).

Gender differences in PTSD risk could also be a consequence of gender differences in rates of other risk factors such as pre-existing psychopathology, and prior trauma history (Breslau et al., 1997; Kessler et al., 1994). Alternatively, males and females may differ in their peritraumatic responses during a traumatic event. Women tend to report greater subjective distress during and following the traumatic event (Norris et al., 2002). Furthermore, women are likely to endorse greater emotional and symptomatic reactivity to a trauma, perhaps due to biological and/or socialization differences (Feldner, Zvolensky, Schmidt, & Smith, 2008). For instance, women have been found to report greater perceived threat than men (Lundin et al., 1993; Anderson & Manuel, 1994) and higher rates of anxiety sensitivity (Feldner et al., 2008).

Differing biological responses following a traumatic event may also be an underlying mechanism of observed gender differences in the development of PTSD. For instance, the relationship between cortisol levels and subsequent PTSD has been found to be stronger in boys than in girls (Delahanty, Nugent, & Christopher, 2005; Ostrowski, Christopher, vanDulmen, & Delahanty, 2007b). Additionally, prior research has found that maltreated males with PTSD show more evidence of adverse brain development than maltreated females with PTSD (DeBellis et al., 1999). More specifically, results found greater total corpus callosum area
reduction, greater cerebral volume reduction, and larger total lateral ventricles in maltreated males (DeBellis et al., 1999). Furthermore, women have been found to be more physiologically reactive than men to trauma stimuli (Orr & Pitman, 1993). These varying biological abnormalities may account for some of the gender differences in PTSS demonstrated in boys versus girls.

Alternatively, gender differences could also reflect differences due to parental responses to the child’s trauma (Famularo, Kinscherff, & Fenton, 1994; McFarlane, 1988). Research suggests that mothers’ communication styles with their children differ between males and females. Mothers have been found to communicate with their sons in a manner that allows their sons to have a greater sense of effectance and autonomy whereas mothers encourage a greater sense of responsibility and mutuality in daughters (Robinson & Biringen, 1995). Furthermore, women have been found to be more sensitive to the needs and feelings of others and are more concerned with preserving a sense of harmony and mutual satisfaction in their relationships (Brody, 1995; Halpern, 1992; Heatherington, Burns, & Gustafson, 1998). As a result, girls may be more aware of their parents’ distress than similarly traumatized boys and may try to alleviate others’ distress at the cost of their own adjustment. Conversely, parents may use different types of parenting and discipline with boys versus girls (Kerr, Lopez, Olson, & Sameroff, 2004) or may use similar types of parenting but may use them in response to different child transgressions (Smetana, 1989). These divergent parenting practices may further exacerbate underlying vulnerabilities in boys versus girls following their traumatic event.
Prior Research

In order to test the impact of maternal PTSS on boys’ and girls’ adjustment following pediatric injury we conducted a small pilot study (Ostrowski et al., 2007a; Ostrowski et al., 2007b). Specifically, this study prospectively examined the interaction of 6-week mother and child PTSS in predicting 7-month child PTSS. Preliminary findings did not suggest a significant interaction between overall PTSS in the mother and child; however, examination of specific symptom clusters revealed an interaction between mother and child re-experiencing symptoms and mother-child avoidance symptoms. More specifically, when both the mother and child experienced initial high levels of re-experiencing symptoms, the child was more likely to endorse higher subsequent levels of PTSS. This was true in girls but not boys. Moreover, mother and child 6-week avoidance symptoms significantly interacted to predict child PTSS. Results suggested that a child was more likely to suffer from PTSS when the child experienced high levels of avoidance but the mother endorsed low levels of avoidance. However, again, the interaction was significant in girls but not in boys (Ostrowski et al., 2007a).

These preliminary findings underscore the importance of examining both parent and child PTSS following pediatric injury as well as potential child gender differences. However, this preliminary study was limited by a small sample size and limited power to address gender differences in parent-child interaction analyses. Further, we examined posttraumatic distress at 6-weeks and 7-months post-trauma without consideration of acute, in-hospital caregiver and child post-traumatic distress. The present study was designed to replicate and extend our prior research with a larger sample size.
Furthermore, caregiver and child post-traumatic distress was assessed in-hospital, within hours of the event, to examine the differential impact of caregiver and child proximal versus distal variables in the development of child PTSD. Although our preliminary findings suggested that maternal re-experiencing and avoidance symptoms were most associated with the development of 7-month child PTSS, it is unclear whether these symptoms are useful predictors of child PTSS soon after the trauma. For instance, in our prior work, almost all participants endorsed high rates of re-experiencing symptoms during their stay at the hospital as they replayed and thought about the recent event. Similarly, opportunities to avoid thoughts and feelings about the event are limited while in the hospital. Therefore, acute, in-hospital caregiver hyperarousal symptoms may play a more prominent role in predicting persistent child PTSS. Prior research (Schnell et al., 2004) suggests that hyperarousal symptoms within days of hospital admission were the strongest predictors of subsequent PTSD than other PTSD symptom clusters in adults. Elucidation of variables present during the acute phase of responding to a trauma that predict subsequent PTSD will allow for the development of effective screening methods to identify those families at greatest risk for PTSD, and will guide the development of novel, early, family-based interventions.

**Purpose of Present Study**

The present study was designed to examine the development and maintenance of child post-traumatic responses following pediatric injury. Limitations of prior research were addressed through the assessment of the interaction between caregiver and child
acute PTSS and assessment of caregiver and child posttraumatic distress in-hospital and at 2- and 6-weeks post-trauma.

The aims of this study were: (1) examination of child PTSD symptom development over time, (2) elucidation of the impact of specific caregiver PTSS on child adjustment following the child’s traumatic event, and; (3) exploration of potential child gender differences in the development of child PTSS.

Hypotheses

Specific Aim #1. The present study hypothesized that in-hospital levels of PTSD symptoms in the caregiver and child would be associated with greater subsequent PTSS in the child. More specifically, in-hospital symptoms of hyperarousal in the child were hypothesized to have the greatest predictive value with respect to subsequent child PTSD.

Specific Aim #2. Given prior research implicating hyperarousal as the strongest predictor of subsequent distress and other PTSD symptom clusters (Schnell et al., 2004), caregiver in-hospital hyperarousal was hypothesized to have the greatest impact on the development of child PTSD. Caregiver in-hospital re-experiencing and avoidance symptoms were hypothesized to not be as predictive of child PTSS, based on prior research demonstrating that re-experiencing and avoidance symptoms tend to develop a cyclic relationship over time (Horowitz, 1979; McFarlane, 1992; Plumb et al., 2004).
*Specific Aim #3.* Given that girls have been found to experience significant and more enduring PTSS than similarly traumatized boys, girls were hypothesized to be at greatest risk for developing PTSS and to be more vulnerable to caregiver post-traumatic distress.
CHAPTER 2

METHOD

Procedure

Children admitted to Akron Children’s Hospital for a variety of traumatic injuries and their primary caregivers were assessed in-hospital and 2- and 6-weeks post-trauma. Participants were recruited by research assistants employed by the hospital to facilitate research in the Emergency Department (ED). The majority of the research assistants are undergraduate students with an interest in emergency medicine. The research assistants are required to take college course credit and participate in monthly seminars and midterm and final exams concerning research and research protocols. The research assistants were provided a script detailing the study and screener information that they followed to assess whether the children met DSM-IV-TR diagnostic criteria A (see Appendix K). Caregivers and their children were provided with a detailed written consent form with age-appropriate grammar (see Appendix I-J). The study was described verbally in detail to children under the age of 10, who were then asked for their assent. Primary caregivers were informed about the study when the child was considered medically stable (e.g., did not have delirium, was not receiving mechanical ventilation). Participants were screened to ensure that they met DSM-IV-TR criteria A (e.g., fear of life threat and feelings of intense fear, horror, and/or helplessness for themselves or others). In-hospital
assessment measures were then administered to caregivers and pediatric trauma victims to assess acute psychological responses to the trauma. Follow-up sessions were conducted 2- and 6-weeks post-trauma in the participant’s home by a masters-level clinical psychology student with experience in assessing PTSS in children trauma victims and their parents.

**In-hospital Assessment**

The initial in-hospital assessment included gathering self-report information pertaining to the accident and demographic information, such as the child’s grade in school, date of birth, gender, ethnicity, and contact information (e.g., present phone number(s) and address). Parents were asked to complete an information sheet for the authorization for release of medical information for research. This form allowed for the collection of specific medical information from the child’s chart. Child’s height, weight, length of present hospital stay, time of admission and discharge, Glasgow Coma Scale (GCS) score, any medications that were administered during the child’s hospital stay, blood alcohol levels, chronic diseases, and injury severity scores (ISS) were recorded from the child’s medical chart.

Caregivers were also asked to complete 2 self-report measures of post-traumatic distress. Caregivers completed the Center for Epidemiological Studies Depression Scale (CES-D) to assess depressive symptoms and the Impact of Event Scale – Revised (IES-R) to assess caregiver in-hospital PTSS in relation to the child’s trauma. The IES-R was chosen for the present study as it has been validated in both adults (Weiss & Marmar, 1997) and children 8 years and above (e.g., Stallard, Velleman, & Baldwin, 1999;
Pfefferbaum et al., 2003). Child trauma victims were asked to complete a self-report measure of depression (Child Depression Inventory; CDI) and a self-report measure of PTSS (IES-R). Children and their caregivers were asked to complete their questionnaires separately in order to decrease risk of their responses influencing each other.

2-week and 6-week Follow-ups

In order to increase participant comfort and retention, all follow-up assessments were conducted in the participants’ homes. Both follow-ups were identical and involved the assessment of PTSS and depression in both the caregiver and child. Post-traumatic stress responses were assessed using the CAPS-CA for children and the CAPS for caregivers. Due to concerns about caregiver responses coloring child reports and vice versa, the child and caregiver were interviewed in separate rooms. Depressive symptoms were measured in the caregiver and child via the CES-D and the CDI, respectively. Caregivers were also asked to complete a questionnaire concerning demographic information at the 2-week follow-up (e.g., familial income).

Participants

Children between the ages of 8 – 18 who were admitted to Akron Children’s Hospital Emergency Department for non-abuse related injuries were eligible. Patients with a Glasgow Coma Scale score of less than 14, with a chronic mental illness, and/or evidence of Pervasive Developmental Disorders or mental retardation were also excluded. In order to address concerns about participant prior psychopathology, in-hospital self-report of prior mental illness was used and these participants were not
recruited. Of the 120 families approached and screened for eligibility, 118 agreed to participate (98% acceptance rate). Unfortunately, the hospital-based research assistants (RAs) operate on a semester schedule, and thus ending of the semester necessitated a cessation of recruitment prior to reaching our targeted sample size of 120. Discussion with all research personnel determined that the time and monetary costs of training RAs and continuing recruitment for the following year for two participants was excessive. Consequently, only 118 participants were included in the study. Eighty percent of the original sample was retained at the 2-week follow-up and 84% of the original sample was retained for the 6-week time point. No differences were found in terms of demographics, PTSS, and depression at any time points between caregivers and children who did and did not complete the 2-week and 6-week follow-ups (all ps > .09).

Demographic data for the total sample are presented in Table 1. Participants consisted of 72 boys (average age = 11.66, SD = 2.94), 48 girls (average age = 12.77, SD = 2.93), and 1 transgendered child (age = 17) and their caregivers. Caregivers were determined by the person who was present at the time of the child’s admission to the hospital and considered himself/herself to be the child’s primary caregiver. The sample consisted of 106 biological mothers, 10 biological fathers, 1 grandfather, and 1 grandmother. No significant differences were found in terms of income, parental education, PTSS, and depression between the mothers, fathers, or grandparents (all ps > .10).

The final sample was primarily Caucasian (79%; African American 20%; Hispanic 1%). The traumatic events experienced by the children included motor vehicle
Table 1. Demographic Information.

<table>
<thead>
<tr>
<th></th>
<th>Total Sample [M(SD)]</th>
<th>Boys [M(SD)]</th>
<th>Girls [M(SD)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>49</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>21</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>12.17 (3.03)</td>
<td>11.66 (2.94)</td>
<td>12.77 (2.93)</td>
</tr>
<tr>
<td>Income</td>
<td>30,000 – 40,000/yr</td>
<td>30,000 – 40,000/yr</td>
<td>30,000 – 40,000/yr</td>
</tr>
<tr>
<td>Parental Education</td>
<td>Some College</td>
<td>Some College</td>
<td>Some College</td>
</tr>
<tr>
<td>Types of Injury (Number)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MVA (Motor Vehicle Accidents)</td>
<td>60</td>
<td>32</td>
<td>28</td>
</tr>
<tr>
<td>Sports Injury</td>
<td>29</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Falls</td>
<td>19</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Physical Assault</td>
<td>12</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

accidents (n = 60), sports injuries (n = 29), falls (n = 19), and physical assaults (e.g., hit by a peer at school; n = 12).

Measures

Demographics

Caregivers were asked to answer several questions concerning basic demographic information such as ethnicity, grade in school, highest level of educational attainment of the child’s parent, and parental income (Appendix M).
Psychological Assessment

PTSD. In-hospital child and caregiver PTSS were assessed with the Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997; Appendix N). The IES-R is a 22-item self-report measure that reflects the DSM-IV cluster criteria for PTSD. Respondents were asked to focus on the child’s traumatic event as the stressful event. Each item was rated for frequency of occurrence and weighted on a 4-point scale. Scores were calculated for the total score and for each subscale. Cronbach alpha for the current study was .86.

Child PTSD symptoms at 2-weeks and 6-week post-trauma were assessed using the Clinician Administered PTSD Scale for Children and Adolescents (CAPS-CA; Nader et al., 1996; Appendix O). This semi-structured clinical interview scores each PTSD symptom in terms of frequency and intensity. Individual items are summed to yield a continuous total symptom score or may be used to provide a categorical diagnosis. Symptoms were recorded as present if the child received a minimum score of 1 for frequency and 2 for intensity (Nader et al., 1996). According to DSM-IV criteria, diagnostic levels of PTSD were met if at least one re-experiencing symptom (Criteria B), three avoidance symptoms (Criteria C), and two hyperarousal symptoms (Criteria D) were present. Diagnostic levels of PTSD are relatively low in child ED samples, although subthreshold PTSD is more common (Kassam-Adams, Garcia-Espana, Fein, & Winston, 2005). Subthreshold criteria were met if the participant endorsed at least 1 symptom out of each symptom cluster (Stein et al., 1997). Prior research has demonstrated that those with subthreshold PTSD often endorse similar levels of impairment as those meeting full PTSD criteria (Carlier & Gersons, 1995; Marshall et al., 2001; Stein et al., 1997).
Therefore, the majority of analyses were based on a continuous measure of PTSD (CAPS-CA total scores). Cronbach alpha for the current study was .85.

Caregivers were administered the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995; Appendix P) to assess the presence of PTSD symptoms stemming from their child’s traumatic injury at 2-weeks and 6-weeks post-trauma. The CAPS is a semi-structured interview that provides both a continuous measure of PTSD severity as well as a categorical diagnosis based on DSM-IV criteria (Blake et al., 1995). The CAPS uses clear behavioral anchors, a time frame equivalent to that of the DSM criteria, and separate frequency and intensity ratings. Cronbach alpha for the present study was .85.

Prior Trauma History

Prior trauma history in both the child and caregiver was assessed via the CAPS-CA and CAPS, respectively. As part of the interview, participants were asked if they had experienced a traumatic event in which they felt that their life or the life of someone else was in danger and experienced intense feelings of fear, horror, or helplessness in addition to the index trauma. Fifty-two children and 42 caregivers reported a prior trauma history.

Depression

Due to the fact that high rates of comorbidity have been found between depression and PTSD (Deering et al., 1996; Helzer, Robins, & McEvoy, 1987), current depressive symptoms were assessed in both the caregiver and child. Child depression severity was measured with the Children’s Depression Inventory (CDI; Kovacs, 1982; Appendix Q). The CDI contains 27-items intended to be used with children between the
ages of 8-17 and is written at a first grade reading level. It takes about 10-15 minutes to complete. The child was asked to endorse which of three provided descriptions most applied to that child over the last two weeks. The CDI covers the DSM criteria for major depressive syndrome in children and provides a continuous measure of symptom severity. Internal consistency has been found to be .86 for heterogeneous psychologically referred sample of children, .71 for a pediatric-medical outpatient group, and .87 with a sample of public school children. Cronbach alpha for the current study was .90.

Parental depression was assessed with the Center of Epidemiological Studies - Depression Scale (CES-D; Radloff, 1977; Appendix R). The CES-D is a 20-item self-report measure of depressive symptoms. Items were scored on a four-point Likert scale from 0 (rarely or none of the time) to 3 (most of the time). A total depression score was obtained by summing the items. Cronbach alpha for the present study was .88.

**Medical Information**

Information relevant to the child’s post-traumatic adjustment was gathered from the child’s medical chart. Specifically, the child’s height, weight, length of stay, time of admit and discharge, GCS score, medicines administered, blood alcohol content, and chronic diseases were noted. Objective injury data were collected from the participants’ charts and used to compute the Injury Severity Scale (ISS; Baker, O’Neil, Haddon, & Long, 1974) scores. ISS scores range from 0 – 75, with a score of less than 10 suggesting a minor injury, 10 – 15 indicating serious injury, and a score of greater than 25 suggesting severe injuries.
Analysis Plan: Statistical Analyses

Preliminary Analyses

First, preliminary analyses were run in Statistics Package for the Social Sciences Version 15 (SPSS; SPSS 2006) to determine potential correlations between variables. Initial one-way analyses of variance (ANOVAs) were conducted to determine whether child PTSS levels differed by categorical demographic variables (i.e., gender, race). Pearson-product moment correlations were used to detect additional covariates. Additional covariates were entered into the model as free to float.

Structural Equation Modeling (SEM) was used to test the hypothesized relationships among caregiver and child in-hospital PTSS and the development of child PTSS. SEM is a multivariate statistical technique used to examine direct and indirect relationships between 1 or more independent and 1 or more dependent variables. SEM was chosen for the current study because it takes into account the modeling of interactions, nonlinearities, measurement error, and multiple latent constructs (i.e., abstract psychological variables each measured by multiple indicators: Bollen, 1989).

Using AMOS Version 7.0, covariance matrices and maximum-likelihood were used as the method of estimation for all models tested. Maximum-likelihood estimations (MLE) provided estimates based on maximizing the probability that the observed covariances were drawn from a population assumed to be the same as that reflected in the coefficient estimates.
Hypothesized Model

The proposed model was hypothesized to reflect the temporal development of child PTSS following pediatric injury. The model depicts the impact of child in-hospital total PTSS and PTSD symptom clusters on the development of child total PTSS at follow-up. The direction of the relationship of the proposed model was chosen to make chronological sense. This hypothesized model was used to guide preliminary statistical analyses. We readily acknowledge that other variables may impact the present model, but the model was provided to organize the hypotheses that describe a likely sequence of events by which caregiver and child PTSS can affect the child’s post-traumatic adjustment. Due to concerns of low statistical power resulting from a small sample size, only those variables that were related to child 2-week or 6-week PTSS were included in the model.

Specific Aim #1. Examination of Child PTSD Symptom Development

SEM was used to test the hypothesized relationships among child in-hospital PTSD symptom clusters (i.e., re-experiencing, hyperarousal, and avoidance) and child PTSS at follow-up. Maximum-likelihood estimations (MLE) standard coefficients were used in addition to the Non-Normed Fit Index (NNFI)/Tucker Lewis Index (TLI) and the Root Mean-Square Error of Approximation (RMSEA). These fit indices were appropriate because they are less influenced by sample size and are less influenced by parsimonious models. Adequate fit of the model to the data was indicated by values of .90 or greater for the NNFI/TLI and .05 or smaller for the RMSEA.
Figure 1. Hypothesized Model of PTSD, Including In-hospital PTSD Symptom Clusters and Child PTSS at Follow-up. This model was used to test both child symptom development and caregiver-child symptom interactions. This model was examined twice, once examining the development of child 2-week PTSS and a second time in order to examine the development of 6-week PTSS. When testing caregiver-child symptom interactions the model was tested in two groups (e.g., high and low caregiver PTSS) to examine the differential impact of caregiver PTSS on specific child in-hospital PTSD symptoms. Again, the model was analyzed twice in order to examine the impact of child 2- and 6-week PTSS.
Specific Aim #2. Examination of Caregiver and Child PTSD Symptom Interactions

In order to determine if overall caregiver PTSS differentially impacted specific in-hospital child PTSS in the development of subsequent child PTSS, a multisample path analysis was conducted. The proposed model was examined twice. First, the model examined whether caregiver PTSS differentially impacted child in-hospital PTSD symptoms in the development of child 2-week PTSS. The model was analyzed a second time to examine the impact of caregiver in-hospital caregiver PTSS on the development of 6-week child PTSS. Two-week and 6-week PTSS were examined separately as DSM-IV diagnostic criteria does not allow for the diagnosis of PTSD until 4-weeks post-trauma. Furthermore, research demonstrates that child PTSS decreases over time with approximately 25% of children endorsing clinically significant PTSS at 2-week post-trauma and 15% meeting at the 3-month follow-up (Bryant et al., 2004; Meiser-Stedman et al., 2005).

Total caregiver PTSS was split to form 2 different groups using a median split (high versus low). This decision was based on the premise of using the most conservative statistic and retaining as many subjects as possible. Additionally, the distribution of caregiver distress was found to be bimodal. The hypothesized model (Figure 1) was tested for the differential impact of caregiver PTSS on in-hospital child PTSD symptom clusters in the development of child PTSS. Multisample analysis tested whether the parameters (i.e., pathways from child in-hospital PTSS to follow-up child PTSS) remained the same in different groups (i.e., high versus low total caregiver PTSS).
First, we tested for invariance by comparing an unconstrained model versus a constrained model. This tested whether the direct effects of total caregiver PTSS differed across the groups (high versus low caregiver PTSS). The fit of the constrained model was then compared with the unconstrained model using the chi-square difference test. If there was significant chi-square difference between the constrained and unconstrained models, the fit indices were examined to determine adequate fit.

To determine whether the impact of caregiver PTSS on the development of child PTSS was driven by any particular PTSD symptom cluster, subsequent analyses examined the impact of specific caregiver PTSS. Given prior research demonstrating the predictive value of acute hyperarousal symptoms (Schnell et al., 2004), we specifically focused on caregiver hyperarousal. We followed the same hypothesized model that was used in testing the differential impact of overall caregiver PTSS (see Figure 1). Caregiver hyperarousal scores were used to split participants into 2 groups (high versus low) using a median split. First, invariance in an unconstrained model for all groups combined was tested. Second, we analyzed a model where the parameters were constrained to be equal between the groups. If the chi-square difference statistic suggested a significant difference between the original and constrained-equal models, this indicated that the model differed across groups.

Due to concerns about small sample size resulting in limited power and the influence of potential confounds such as age and gender, multisample analysis was used to test the impact of caregiver hyperarousal. The impact of other caregiver posttraumatic distress symptoms were tested in post-hoc analyses using regression equations.
Specific Aim #3. Examination of Potential Child Gender Differences in the Development of Child PTSS.

Exploratory analyses were conducted to examine potential child gender differences in the development of PTSD. Given our sample size and the unequal sample distribution of males (n= 72) and females (n= 48), we had limited power to conduct the proposed model in boys and girls separately. However, given prior research suggesting that female child trauma victims were more negatively impacted by maternal PTSS (Ostrowski et al., 2007), we attempted to further understand these gender differences using the proposed model (see Figure 1). As such, multisample analyses were conducted to examine between gender differences. However, due to concerns about statistical power, between gender differences were not conducted in the examination of caregiver PTSS on the development of child PTSS.

Power Analyses

Estimated sample size was determined using Bentler’s (1998) recommendation for adequate sample size using SEM. According to Bentler, 5 cases per parameter estimate (N:q) would provide the necessary sample size to identify significant relationships. This method is the best method in achieving adequate power for hypothesis testing because it takes into consideration the complexity of the model considered. Following this estimation, a minimum sample of 120 was necessary to identify a significant relationship between in-hospital PTSS and subsequent child PTSS. However, due to logistics in recruitment, only 118 participants were included in the final sample.
Consequently, care was taken in examining marginal findings due to the possibility that failure to find significance may have stemmed from inadequate power.
CHAPTER 3

RESULTS

Demographics

Preliminary analyses were conducted to determine potential correlations child 2-week and 6-week PTSS and possible covariates. Initial Pearson product moment correlations revealed that age, ISS, and family income were not related to child PTSS at any of the time-points (in-hospital: age: r= .10, p= .35, ISS: r= .11, p = .20, income: r= .08, p= .52; 2-weeks post-trauma: age: r= .19, p= .08; income: r= .05, p= .48; ISS: r= .04, p= .67; 6-weeks post-trauma: age: r= .12, p= .29; ISS: r= .10, p= .23; income: r= .07, p= .50). Further, type of injury was not found to be related to PTSD or depressive symptomatology in the child (all ps> .09) or the caregiver (all ps> .18).

Analyses of variance (ANOVAs) found race to be significantly related to child total IES scores such that African Americans were found to report higher rates of in-hospital PTSS than Caucasians and Hispanics (3.92 ± .60 versus 2.77 ± 1.86 versus .71 ± .00; F(3,92)= 3.52, p≤ .05). However, no significant differences were found with regards to race for any of the follow-up variables (all ps> .12). Analyses were also conducted excluding the two Hispanic participants and the two participants who identified their race as “other” to further elucidate potential differences between Caucasian and African American participants. Results revealed that African American children and caregivers
reported higher rates of in-hospital PTSS than Caucasian children and caregivers (children: $3.92 \pm 2.33$ versus $2.77 \pm 1.86$; $F(1,82)= 4.31, p \leq .05$; caregivers: $3.08 \pm 3.29$ versus $1.57 \pm 1.87$; $F(2,90)= 3.29, p \leq .05$). However, no significant differences were found with regards to race for any of the follow-up variables (all $p$s $> .10$). Due to nonsignificant correlations between the outcome variables (i.e., child 2-week/6-week PTSS) and age, ISS, race and family income, none of these variables were entered as free to float in the model.

Girls reported significantly higher levels of PTSS than boys in-hospital (IES-R: $3.17 \pm 2.18$ versus $2.65 \pm 1.67$, respectively; $F(2,88)= 5.95, p \leq .01$) and at 2-weeks post-trauma (CAPS-CA: $18.30 \pm 13.88$ versus $16.56 \pm 10.87$, respectively; $F(2,93)= 5.14, p \leq .01$), but did not significantly differ from boys at 6-weeks post-trauma (CAPS-CA: $19.56 \pm 17.51$ versus $16.20 \pm 14.96$, respectively; $F(2,88)= 2.63, p=.08$). Gender differences were also found for in-hospital depressive symptoms ($9.51 \pm 7.50$ versus $6.85 \pm 4.94$, respectively; $F(2,109)= 17.07, p \leq .001$) but not at 2-weeks and 6-weeks post-trauma (all $p$s $> .84$; see Table 2).

*Posttraumatic Stress Symptoms in Caregiver and Child*

Two-weeks following the child’s admission, 17 (18%) children and 6 (6%) caregivers endorsed at least subthreshold levels of PTSS. Fifteen percent (n= 15) of the children and no caregivers met subthreshold criteria for PTSD at the 6-week follow-up. Caregiver and child PTSS were significantly correlated at each time-point (in-hospital: $r= .44, p \leq .001$; 2-weeks post-trauma: $r= .34, p \leq .001$; 6-weeks post-trauma: $r= .26, p \leq .02$).
Table 2. *Descriptive Analyses.*

<table>
<thead>
<tr>
<th></th>
<th>Total Sample</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-hospital PTSS</td>
<td>2.92 (SD=1.96)</td>
<td>2.65 (SD=1.67)**</td>
<td>3.13 (SD=2.18)**</td>
</tr>
<tr>
<td>(IES-R)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-hospital Depression</td>
<td>8.28 (SD=6.84)</td>
<td>6.86 (SD=4.94)**</td>
<td>9.51 (SD=7.50)**</td>
</tr>
<tr>
<td>(CDI)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2-week PTSS</td>
<td>17.76 (SD=12.48)</td>
<td>16.56 (SD=10.87)**</td>
<td>18.30 (SD=13.88)**</td>
</tr>
<tr>
<td>(CAPS-CA)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2-week Depression</td>
<td>4.04 (SD=3.98)</td>
<td>4.17 (SD=4.08)</td>
<td>3.76 (SD=3.87)</td>
</tr>
<tr>
<td>(CDI)</td>
<td></td>
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<tr>
<td>6-week PTSS</td>
<td>17.88 (SD=16.28)</td>
<td>16.20 (SD=14.96)</td>
<td>19.56 (SD=17.51)</td>
</tr>
<tr>
<td>(CAPS-CA)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6-week Depression</td>
<td>4.80 (SD=5.77)</td>
<td>4.63 (SD=5.75)</td>
<td>5.06 (SD=5.96)</td>
</tr>
<tr>
<td>(CDI)</td>
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<tr>
<td><strong>Caregivers</strong></td>
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<tr>
<td>In-hospital PTSS</td>
<td>1.86 (SD=2.18)</td>
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<tr>
<td>(IES-R)</td>
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<tr>
<td>In-hospital Depression</td>
<td>15.23 (SD=7.64)</td>
<td></td>
<td></td>
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<tr>
<td>(CES-D)</td>
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<tr>
<td>2-week PTSS</td>
<td>11.61 (SD=12.32)</td>
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</tr>
<tr>
<td>(CAPS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-week Depression</td>
<td>15.90 (SD=6.15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(CESD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-week PTSS</td>
<td>9.52 (SD=3.52)</td>
<td></td>
<td></td>
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<tr>
<td>(CAPS)</td>
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<tr>
<td>6-week Depression</td>
<td>17.58 (SD=3.35)</td>
<td></td>
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<tr>
<td>(CESD)</td>
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</tr>
</tbody>
</table>

***p ≤ .001, **p ≤ .01
Furthermore, caregiver and child depression symptoms were correlated at 6-weeks post-trauma ($r = .83; p \leq .001$) but not in-hospital ($r = .14, p = .20$) or at 2-weeks post-trauma ($r = .14; p = .18$; see Table 3, Appendix A - C).

<table>
<thead>
<tr>
<th></th>
<th>In-hospital</th>
<th>2-week</th>
<th>6-week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver PTSS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>In-hospital total sample</td>
<td>.44***</td>
<td>.34**</td>
<td>.13</td>
</tr>
<tr>
<td>In-hospital boys</td>
<td>.51***</td>
<td>.26</td>
<td>-.10</td>
</tr>
<tr>
<td>In-hospital girls</td>
<td>.49**</td>
<td>.30</td>
<td>.34</td>
</tr>
<tr>
<td>2-week total sample</td>
<td>.09</td>
<td>.34**</td>
<td>.08</td>
</tr>
<tr>
<td>2-week boys</td>
<td>.04</td>
<td>.24</td>
<td>-.02</td>
</tr>
<tr>
<td>2-week girls</td>
<td>.25</td>
<td>.37*</td>
<td>.12</td>
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<tr>
<td>6-week total sample</td>
<td>.19</td>
<td>-.12</td>
<td>.26*</td>
</tr>
<tr>
<td>6-week boys</td>
<td>.21</td>
<td>.12</td>
<td>.22</td>
</tr>
<tr>
<td>6-week girls</td>
<td>.24</td>
<td>-.33</td>
<td>.25</td>
</tr>
</tbody>
</table>

*** $p \leq .001$, ** $p \leq .01$, *p $\leq .05$

Separate gender analyses revealed significant correlations between caregiver and child in-hospital PTSS for both boys ($r = .51; p \leq .001$) and girls ($r = .49; p \leq .01$).

Caregiver and child PTSS were significantly correlated at 2-week post-trauma for girls ($r = .37; p \leq .05$) but not for boys ($r = .24; p = .07$). At 6-weeks post-trauma, caregiver and child PTSS were not significantly correlated for boys ($r = .22; p = .11$) or for girls ($r = .25; p = .15$).
Between gender analyses revealed nonsignificant correlations between caregiver and child depressive symptomatology at the in-hospital (boys: r = .20; p = .14; girls: r = .14; p = .50) and 2-week (boys: r = .07; p = .61; girls: r = .25; p = .17) time-points. However, caregiver and child depression scores were significantly correlated for both boys and girls at 6-week post-trauma (boys: r = .83; p ≤ .001; girls: r = .83; p ≤ .001).

Specific Aim #1: Development of Child PTSD

Structural Equation Modeling was used to examine the development of child PTSS at 2-weeks and 6-weeks post-trauma. Multisample analyses tested the fit of the constrained versus unconstrained models in detecting potential child gender differences. Preliminary examination of the data revealed that all assumptions of SEM, such as homoscedasticity and multicolinearity, were met. Missing data were handled through listwise deletion. With listwise deletion, cases with missing observations on any variable in an analysis are excluded from all computations. The advantage of using listwise deletion is that all analyses will be conducted with the same cases. In all model testing, covariance matrices and maximum-likelihood were used as the method of estimation. Maximum-likelihood estimations (MLE) provided estimates based on maximizing the probability that the observed covariances were drawn from a population assumed to be the same as that reflected in the coefficient estimates. The hypothesized model was properly overidentified in all analyses.

First, the model tested whether child in-hospital overall symptoms of PTSS predicted total child PTSD at follow-up (see Figure 2). Results found that child in-hospital symptoms of PTSS predicted child PTSD symptoms at 2-weeks (see Appendix
Figure 2. Examination of the Model of In-hospital PTSS predicting Child 2-week PTSS.
A: $\chi^2 = 7.56$, df = 5, TFI = .98, RMSEA = .001, CI = .00, .15) and 6-weeks post-trauma (see Appendix B: $\chi^2 = 6.24$, df = 5, $p = .28$, TLI = .99, RMSEA = .04, CI = .00, .14).

Multisample analyses for between gender differences suggested that the constrained model was not a good fit (2-weeks: TLI = .66, RMSEA = .10, CI = .03, .15; 6-weeks: TLI = .78, RMSEA = .08, CI = .00, .14) and was not significantly different from the unconstrained model (2-weeks: $\Delta \chi^2 = 8.10$, df = 8, $p = .48$; 6-weeks: $\Delta \chi^2 = 7.70$, df = 8, $p = .46$).

Two-week PTSS. Examination of the hypothesized model evaluating the development of child 2-week PTSS found an adequate fit to the overall model (see Figure 3; $\chi^2 = 2.55$, $p = .44$, df = 3, TLI = 1.0, RMSEA = .00, CI = .00, .14). Child in-hospital levels of hyperarousal were found to predict 2-week child PTSS ($p \leq .01$) and 2-week child hyperarousal ($p \leq .01$). In-hospital levels of child avoidance and re-experiencing did not predict 2-week child PTSS (all $p$s $> .12$) or specific 2-week PTSD symptoms (all $p$s $> .12$).

Between gender differences on the development of child PTSS were examined using multisample analyses. Results of the hypothesized model revealed a poor fit of the constrained model (TLI = .76, RMSEA = .09, CI = .00, .17) and was not significantly different from the unconstrained model ($\Delta \chi^2 = 11.27$, df = 8, $p = .08$) suggesting no significant differences between boys and girls based on the hypothesized model of the development of child 2-week PTSS.

Six-week PTSS. Examination the specificity of PTSD symptoms clusters in predicting child 6-week PTSS revealed an adequate fit to the model (see Figure 4: $\chi^2$ =
**p \leq .01

*Figure 3.* Examination of the Hypothesized Model Predicting Child 2-week PTSS.
In-hospital Avoidance

In-hospital Re-experiencing

In-hospital Hyperarousal

6-week Avoidance

6-week Re-experiencing

6-week Hyperarousal

6-week PTSS

d1

#p = .06

Figure 4. Hypothesized Model Predicting Child 6-week PTSS.
4.54 df= 2, p= .21, TLI= .97, RMSEA= .07, CI= .00, .18). However, unlike the model examining 2-week PTSS, child in-hospital levels of avoidance was found to predict 6-week PTSS (p= .06). Further, child in-hospital avoidance predicted child 6-week avoidance (p= .06). In-hospital levels of child re-experiencing and hyperarousal did not significantly predict child 6-week PTSS. Between gender analyses revealed a poor fit to the data (TLI= .69, RMSEA= .19, CI= .06, .13) and was not significantly different from the unconstrained model ($\Delta \chi^2= 7.70$, df= 8, p= .46).

**Specificity of Child In-hospital PTSS in predicting Subsequent Child PTSS.**

Due to the high rates of comorbidity frequently found between depression and PTSS, analyses were conducted including child concurrent depression in order to examine whether child in-hospital PTSD symptoms equally predict both PTSD and depression (see Figure 5). Analyses revealed that the data is a poor fit to the model ($\chi^2= 13.3$, df= 5, p= .02, TLI= .77, RMSEA= .11). Inspection of individual pathways suggest that hyperarousal is a specific predictor of child PTSS rather than a predictor of both PTSD and depression ($p \leq .01$). All other pathways were found to be nonsignificant (all $p > .11$). Multisample analyses for between gender differences suggested that the constrained model was not a good fit (TLI= .77, RMSEA= .11, CI= .06, .18) and was not significantly different from the unconstrained model ($\Delta \chi^2= 8.96$, df= 8, p= .09).

**Six-week PTSS.** Similar to the model examining child 2-week post-traumatic distress that included depression (see Figure 4), analyses examined the development of child post-traumatic distress. The model was a poor fit for the data (see Appendix D: $\chi^2=$
Figure 5. Hypothesized Model Examining 2-week Child Post-traumatic Distress.
57.80, df = 8, p = .001, TLI = .88, RMSEA = .22, CI = .17, .28) suggesting the specificity of child in-hospital PTSD symptom clusters in predicting child 6-week PTSS. Between gender analyses suggested no significant differences between males and females (Δχ² = 7.90, df = 8, p = .38, TLI = .81, RMSEA = .20, CI = .04, .15).

Specific Aim #2. Examination of Caregiver and Child PTSD Symptom Interactions

Specific Aim #2A: Total In-Hospital Caregiver Posttraumatic Distress

Two-week PTSS. Multisample group analyses were conducted to examine the extent to which caregiver in-hospital PTSD symptoms impacted the development of child PTSS. First, analyses inspected the constrained versus unconstrained models of the impact of caregiver total in-hospital PTSS on the development of child 2-week PTSS (see Figure 3). Results revealed that the constrained model was not a good fit (TLI = .88, RMSEA = .09, CI = .01, .10) and was not significantly different from the unconstrained model (Δχ² = 6.85, df = 8, p = .55) thereby suggesting that the caregiver overall PTSS did not significantly interact with child in-hospital PTSS in the development of child 2-week PTSS.

Six-week PTSS. Similarly, inspection of total caregiver in-hospital PTSS on child in-hospital PTSS in predicting child 6-week PTSS (see Figure 6) produced nonsignificant results (Δχ² = 6.60, df = 8, p = .58, TLI = .86, RMSEA = .10, CI = .04, .12). These nonsignificant findings may be due, in part, to the lack of statistical power due to
a relatively small sample size. Additionally, due to the small sample size, within gender
multi-sample analyses were not conducted.

Specific Aim #2B: Caregiver In-hospital Hyperarousal

Two-week PTSS. Multisample analyses examined the impact of specific caregiver
PTSD symptoms clusters, more specifically caregiver hyperarousal, in the development
of child 2-week PTSS (see Figure 3). Results revealed that the constrained model was a
poor fit (TLI=.84, RMSEA=.08, CI=.00, .15) and was not significantly different from
the unconstrained model ($\Delta \chi^2=11.65$, df= 8, p=.17).

Six-week PTSS. The model remained nonsignificant in the development of child
6-week PTSS (see Figure 6; ($\Delta \chi^2=38.73$, df= 30, p=.13, TLI=.79, RMSEA=.22, CI=
.10-.20). Between gender analyses were not conducted due to concerns of low statistical
power as a result of the relatively small sample size.

Post-hoc Analyses

Posttraumatic Stress Symptoms. Post-hoc analyses were conducted to further
examine the interaction of caregiver and child PTSD symptoms in the development of
child PTSS. Hierarchical linear regression analyses were conducted in order to further
examine the extent to which other caregiver posttraumatic distress symptoms (i.e.,
caregiver avoidance and re-experiencing symptoms) interacted with child in-hospital
PTSD symptoms in predicting child PTSS at each follow-up. Concurrent child
depression was entered into the first step and each specific caregiver and child in-
hospital PTSD symptom cluster (i.e., caregiver/child avoidance symptoms; caregiver/child re-experiencing symptoms) was entered into the second step, and the interaction of each caregiver and child PTSD symptom cluster in the final step.

Caregiver avoidance and child re-experiencing symptoms did not significantly interact in predicting child 2-week PTSS in the total sample ($\Delta R^2 = .02, p = .20$) or in boys ($\Delta R^2 = .02, p = .33$) and girls ($\Delta R^2 = .01, p = .65$) separately. However, a significant interaction was found between caregiver avoidance and child re-experiencing symptoms in predicting 6-week child PTSS ($\Delta R^2 = .07, p \leq .02$; see Table 4, Figure 6). Decomposition of this interaction suggested that high levels of caregiver avoidance and high levels of child re-experiencing symptoms predicted 6-week child PTSS. Within gender analyses revealed a trend for girls ($\Delta R^2 = .12, p \leq .07$) but not for boys ($\Delta R^2 = .00, p = .75$) such that, in girls, higher levels of caregiver avoidance and child re-experiencing symptoms predicted child 6-week PTSS.

Additional regression analyses examining the interaction of caregiver and child posttraumatic responses did not predict child PTSS at either time-point (all $p$s $> .13$). Further, no gender differences were found for all nonsignificant interactions (all $p$s $> .51$).

*Depression.* Similar hierarchical linear regression analyses examined the interaction of caregiver and child in-hospital levels of depression in predicting child PTSS at follow-up. Results suggest that in-hospital levels of caregiver and child depression significantly interacted to predict child 2-week PTSS (see Table 5, Figure 7; $\Delta R^2 = .09, p = .01$), such that high levels of in-hospital caregiver depression and low levels of child in-hospital depression predicted child 2-week PTSS.
Table 4. *Summary of Hierarchical Regression Analysis for Variables Predicting 6-week Child PTSS*

<table>
<thead>
<tr>
<th>Step no.</th>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>Δ R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6-week Child Depression</td>
<td>.74</td>
<td>.32</td>
<td>.27</td>
<td>.07*</td>
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<tr>
<td>2</td>
<td>In-hospital Caregiver Avoidance</td>
<td>4.31</td>
<td>2.76</td>
<td>.20</td>
<td>.03</td>
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<td></td>
<td>In-hospital Child Re-experiencing</td>
<td>-.83</td>
<td>2.27</td>
<td>-.05</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>In-hospital Caregiver Avoidance x Child In-hospital Re-experiencing</td>
<td>-6.76</td>
<td>2.87</td>
<td>-.28</td>
<td>.07*</td>
</tr>
</tbody>
</table>

*p ≤ .05
Significance of Regression Model F(4, 69) = 3.49, p ≤ .01

Table 5. *Summary of Hierarchical Regression Analysis for Variables Predicting 2-week Child PTSS.*

<table>
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<tr>
<th>Step no.</th>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>Δ R²</th>
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<tr>
<td>1</td>
<td>In-hospital Caregiver Depression</td>
<td>.58</td>
<td>.18</td>
<td>.37</td>
<td>.18**</td>
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<td></td>
<td>In-hospital Child Depression</td>
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<td>.23</td>
<td>.16</td>
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</tr>
<tr>
<td>2</td>
<td>In-hospital Caregiver Depression x Child In-hospital Depression</td>
<td>-.09</td>
<td>.03</td>
<td>-.32</td>
<td>.09**</td>
</tr>
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</table>

**p ≤ .01
Significance of Regression Model F(3, 66) = 7.68, p ≤ .001
Figure 6. Interaction of In-hospital levels of Caregiver Avoidance and Child Re-experiencing Symptoms in Predicting 6-week Child PTSD Symptoms.

Figure 7. Interaction of Caregiver and Child In-hospital Depression in Predicting Child 2-week PTSD Symptoms.
Between gender analyses revealed significant interactions for caregivers and boys ($\Delta R^2=.08, p \leq .05$) and a trend in girls ($\Delta R^2=14, p=.06$). Decomposition of these interactions revealed high levels of in-hospital depression significantly interacted with low levels of child in-hospital depression in predicting child PTSS 2-weeks post-trauma. Examination of child 6-week PTSS revealed a nonsignificant interaction of caregiver and child in-hospital levels of depression in predicting child 6-week PTSS in the total sample ($\Delta R^2=.03, p=.15$) and in boys ($\Delta R^2=.01, p=.59$) and girls ($\Delta R^2=.05, p=.40$) separately.

**Prior Trauma History**

Due to research suggesting the impact of prior trauma history on the development of PTSD and PTSD symptoms, all analyses were conducted without those children with a prior trauma history. After excluding those children with a prior trauma history, rates of PTSD decreased. At 2-week post-trauma, 2 caregivers and 10 children met at least subthreshold PTSD criteria. No children or caregivers reported at least subthreshold PTSD criteria at 6-week post-trauma.

Exclusion of those children with a prior trauma history did not significantly impact the majority of the results. However, gender differences were no longer found in terms of in-hospital, 2-week, and 6-week PTSS. Further, at 2-weeks post-trauma caregiver and child PTSS were significantly correlated at 2-week post-trauma for boys ($r=.40; p \leq .01$) but not for girls ($r=-.11; p=.67$).

Furthermore, after removing those children with a history of prior traumatic events, in-hospital levels of hyperarousal continued to predict child 2-week PTSS (see Appendix E: $\chi^2= 2.08, df=3, p=.57$, TLI= 1.0, RMSEA=.001, CI=.00, .17) and 2-
week child hyperarousal (p ≤ .05). Similarly, in-hospital levels of child avoidance continued to predict child 6-week PTSS (see Appendix F: χ² = 4.11, df = 3, p = .25, TLI = .94, RMSEA = .07, CI = .00, .22) and 6-week child avoidance (p ≤ .05). No between gender differences were found. Multi-sample group analyses revealed that after excluding those children with a prior trauma history, caregiver total PTSS and hyperarousal symptoms did not significantly interact in predicting child 2-week and 6-week PTSS.

In order to further examine the impact of prior trauma history, prior trauma history was included as interaction term in post-hoc analyses. In the first step, child concurrent depression was entered as a control variable. In the second step, child and caregiver in-hospital PTSD symptoms and child prior trauma history were entered into the model. In the third step, all relevant two-way interactions were included. For example, caregiver avoidance x child re-experiencing, caregiver avoidance x child prior trauma history, and child re-experiencing x child prior trauma history were included in the third step. Finally, the fourth step added the three-way interaction term.

Results indicate that caregiver avoidance and child re-experiencing symptoms did not significantly interact in predicting child 2-week [total sample: (ΔR² = .01, p = .35); boys: (ΔR² = .01, p = .52); girls: (ΔR² = .03, p = .39)] or 6-week PTSS [total sample: (ΔR² = .02, p = .24); boys (ΔR² = .04, p = .24)]. However, a trend was found in girls (ΔR² = .10, p = .06] in which high levels of caregiver avoidance and high levels of child re-experiencing symptoms predicted 6-week child PTSS. Additional regression analyses examining the interaction of caregiver and child posttraumatic responses did not predict
child PTSS at either time-point (all ps > .11). No gender differences were found for all nonsignificant interactions (all ps > .24). Further, caregiver and child in-hospital depression did not significantly interact in predicting child 2-week PTSS [total sample: ($\Delta R^2 = .01$, p = .53); boys ($\Delta R^2 = .02$, p = .34); girls ($\Delta R^2 = .00$, p = .88)] or 6-week PTSS [total sample ($\Delta R^2 = .00$, p = .61); boys: ($\Delta R^2 = .01$, p = .59); girls: ($\Delta R^2 = .17$, p = .10)].

Exclusion of those Dyads where the Caregiver Witnessed the Child’s Trauma

Prior research has suggested that the strength of the relationship between parent and child PTSS was dependent upon whether the parent was directly involved in the child’s trauma. As such, analyses were also run without those dyads in which the caregivers directly witnessed their child’s trauma (e.g., motor vehicle accidents where the mother was also in the car or at the child’s sporting event; n = 8). Exclusion of those dyads in which the caregivers directly witnessed their child’s trauma, continued to result in significant correlations between caregiver and child in-hospital PTSS (r = .36; p ≤ .01) and at 2-week post-trauma (r = .44; p ≤ .001) for total sample and for boys (in-hospital: r = .47; p ≤ .01; 2-week: r = .34; p ≤ .01). However, in girls, the correlation between caregiver and child PTSS was significant at 2-weeks post-trauma (r = .34; p ≤ .01) but not in-hospital (r = .39, p = .09). Similarly, the correlation between caregiver and child PTSS at 6-weeks post-trauma became nonsignificant for the total sample (r = .22, p = .06) and boys (r = .19, p = .20) and girls separately (r = .19, p = .34).

Removal of those dyads where the caregiver was present at the time of the child’s trauma did not significantly impact the development of child PTSS. Child in-hospital
levels of hyperarousal continued to predict 2-week child PTSS (see Appendix G: p ≤ .01) and 2-week child hyperarousal (p ≤ .05), whereas child in-hospital levels of avoidance continued to predict 6-week child PTSS (see Appendix H: p ≤ .05) and 6-week child avoidance (p ≤ .05). Further, multisample analyses continued to show no gender differences in all analyses conducted and revealed that caregiver total PTSS and hyperarousal symptoms did not significantly moderate child in-hospital PTSD symptoms in the development of child 2-week and 6-week PTSS.

After excluding those dyads where the caregiver was present at the time of the child’s trauma, post-hoc analyses revealed that caregiver avoidance and child re-experiencing symptoms continued to predict 6-week child PTSS (see Table 6: ΔR² = .07, p ≤ .05). Decomposition of this interaction suggested that high levels of caregiver avoidance and high levels of child re-experiencing symptoms predicted 6-week child PTSS. However, contrary to the total sample including these dyads, between gender analyses revealed nonsignificant findings for both girls (ΔR² = .11, p ≤ .08) and boys (ΔR² = .00, p = .75).

In addition, in-hospital levels of caregiver and child depression significantly continued to interact to predict child 2-week PTSS (see Table 7: ΔR² = .13, p = .01), such that high levels of in-hospital caregiver depression and low levels of child in-hospital depression predicted child 2-week PTSS.
Table 6. *Summary of Hierarchical Regression Analysis for Variables Predicting 6-week Child PTSS*

<table>
<thead>
<tr>
<th>Step no.</th>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>Δ R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6-week Child Depression</td>
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<td>.33</td>
<td>.27</td>
<td>.07*</td>
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<td>2</td>
<td>In-hospital Caregiver Avoidance</td>
<td>4.36</td>
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<td>.03</td>
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<td>In-hospital Child Re-experiencing</td>
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<tr>
<td>3</td>
<td>In-hospital Caregiver Avoidance x Child</td>
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<td>-.28</td>
<td>.07*</td>
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<td>In-hospital Re-experiencing</td>
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</table>

* p ≤ .05
Significance of Regression Model F(4,67) = 3.33, p ≤ .02

Table 7. *Summary of Hierarchical Regression Analysis for Variables Predicting 2-week Child PTSS.*

<table>
<thead>
<tr>
<th>Step no.</th>
<th>Variables</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>Δ R²</th>
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<tbody>
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<td>.31</td>
<td>.13*</td>
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<td>.18</td>
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<td>In-hospital Caregiver Depression x Child</td>
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<td>.03</td>
<td>-.38</td>
<td>.13**</td>
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<td>In-hospital Depression</td>
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** p ≤ .01, * p ≤ .05
Significance of Regression Model F(3,59) = 6.50, p ≤ .001
The present study prospectively examined the development of child post-traumatic stress symptoms following pediatric injury. Furthermore, as the development and maintenance of PTSS in a child trauma victim is likely to be influenced by their parents’ responses to the trauma, the interaction between caregiver and child distress was examined in predicting persistent child PTSS. Additional exploratory analyses investigated the extent to which child gender impacted the development of child PTSS.

Results of the present study replicated prior findings of significant correlations between caregiver and child post-traumatic distress. More specifically, a significant positive relationship was found between caregiver and child PTSS in-hospital and at each follow-up time-point. However, the relationship between caregiver and child PTSS decreased over time and differed depending on the child’s gender. Caregiver and child PTSS were significantly related for both boys and girls in-hospital and for girls at 2-weeks post-trauma but not for boys. Further, no significant correlations were found between caregiver and child PTSS for both boys and girls at 6-weeks post-trauma. Given prior research demonstrating that the strength of the relationship between parent and child PTSS was dependent upon whether the parent was directly involved in the child’s trauma, analyses were conducted with and without those dyads in which the caregivers directly
witnessed their child’s trauma. Exclusion of these dyads did not change results regarding correlations between caregiver and child in-hospital PTSS and at 2-week post-trauma for total sample and for boys. However, in girls, the correlation between caregiver and child PTSS was only significant at 2-weeks post-trauma. The decrease in significance between caregiver and child in-hospital PTSS suggests that the impact of caregivers directly witnessing the child’s trauma may have a more negative impact on girls, particularly in the acute aftermath of the trauma.

In contrast to the results with PTSD symptoms, caregiver and child depression symptoms were only significantly correlated at 6-weeks post-trauma. Consistent with prior research demonstrating gender differences in rates of PTSD (Fletcher, 1996; Lipschitz et al., 2000; Lonigan et al., 1994; Smith et al., 2001), female child trauma victims reported more PTSS than males in-hospital and at 2-weeks post-trauma but not at 6-weeks post-trauma. Gender differences were also found for child depression, such that girls reported significantly more depressive symptoms than boys in-hospital but not at any of the follow-up time-points. After removing those dyads in which the caregiver was present at the time of the child’s trauma, the relationship between caregiver and child depression remained significant at 6-weeks post-trauma for the total sample and for boys and girls separately.

The primary aim of the present study was to test models examining the development of child PTSS and the interaction of caregiver and child post-traumatic distress. Inspection of the models revealed that child in-hospital levels of hyperarousal significantly impacted the development of child 2-week PTSS and 2-week hyperarousal
symptoms. The significance of hyperarousal symptoms is consistent with prior literature that has identified acute hyperarousal symptoms as the strongest predictor of PTSD in adults (Schnell et al., 2004). Further, research has found that acute physiological responses immediately following one’s traumatic event can predict subsequent PTSD. More specifically, in adult and child trauma victims, heightened catecholamine response and elevated heart rate soon after a trauma has been associated with increased risk for diagnostic levels of PTSD and higher PTSS (Delahanty et al., 2000; Delahanty et al., 2005; Kassam-Adams, Garcia-Espeña, Fein, & Winston, 2005; McFarlane, Atchison, & Yehuda, 1997; Nugent, Christopher, & Delahanty, 2006; Resnick, Yehuda, Pitman, & Foy, 1995). Hyperarousal during and immediately following trauma may serve as a mechanism through which memories can be “overconsolidated,” ultimately resulting in the re-experiencing symptoms of PTSD (e.g., intrusive thoughts; McGaugh, 1989; Pitman, 1989; Pitman, Orr, Lowenhagen, Macklin, & Altman, 1991). Hyperarousal symptoms may also result in heightened awareness of danger cues but reduced ability to differentiate from less dangerous cues (Risser, Hetzel-Riggin, Thomsen, & McCanne, 2006). Chronic hyperarousal may, over time, desensitize the trauma victim to real threats (Messman-Moore & Long, 2003) and result in the emotional numbing symptoms of the avoidance cluster (Krause, Kaltman, Goodman, & Dutton, 2006). Results of the present study underscore the importance of examining in-hospital levels of hyperarousal in the development of child PTSD.

Contrary to prior research suggesting that hyperarousal symptoms within hours of the traumatic event predicted the maintenance of PTSD and PTSD symptoms (Schnell et
al., 2004), the present study found that child in-hospital levels of avoidance, and not hyperarousal, predicted child 6-week PTSS. Researchers have hypothesized that acute avoidance can temporarily alleviate a trauma victim’s distress; however, prolonged avoidance can hinder the emotional processing of traumatic memories resulting in elevated PTSS (Hayes et al., 1996; Horowitz, 1986; Steil & Enders, 2000). The present study supports this hypothesis in that children who endorsed high levels of in-hospital avoidance did not report elevated PTSS at 2-week post-trauma but did so 6-weeks following their traumatic event.

Post-hoc analyses suggested that caregiver avoidance and child re-experiencing symptoms significantly impacted child post-traumatic adjustment 6-weeks post-trauma. More specifically, a child was more likely to suffer from PTSS when the caregiver experienced high levels of avoidance and the child endorsed high levels of re-experiencing. It would appear that if a child experiences re-experiencing symptoms, such as intrusive thoughts, but is unable to discuss and process these distressing thoughts due to caregiver avoidance, the child is more likely to have difficulty adjusting following his/her trauma. Between gender analyses revealed the interaction between child re-experiencing and caregiver avoidance to be driven by girls but not by boys. Prior research has found similar finding suggesting that acute maternal avoidance had the greatest impact on child adjustment, with the impact being more negative for girls than for boys (Ostrowski et al., 2007a). After excluding those children with a prior trauma history, the interaction between caregiver avoidance and child re-experiencing symptoms was no longer significant. However, excluding children with a prior trauma history reduced the
rates of PTSD and PTSD symptoms in the present sample. Consequently, analyses were conducted on a sample of less symptomatic individuals and may not be reflective of more traumatized individuals.

**Gender and PTSD**

Given findings of the differential predictive ability of various PTSD symptom clusters, it is important to consider each PTSD symptom cluster when examining child PTSS. Furthermore, the relationship between caregiver and child responses to a trauma may be further modified by the child’s gender.

One potential explanation for the finding of gender differences in childhood PTSD may be related to parental distress, particularly for girls. The present study found girls to be more negatively impacted by caregiver PTSS than boys, especially concerning caregiver avoidance. It could be hypothesized that girls may be more cognizant of their caregiver’s distress or their caregiver’s lack of awareness of the child’s psychological turmoil, which may impede the child’s own adjustment. Caregiver avoidance combined with the tendency to internalize distress in girls (Stein et al., 2004) may be particularly detrimental with respect to persistent PTSD symptoms in female child trauma victims.

Multisample analyses were conducted to further examine potential child gender differences in the development of PTSS. It was hypothesized that girls would be at increased risk for developing PTSD and would be more vulnerable to caregiver distress. However, the models were found to be a poor fit to the data suggesting no between gender differences. The lack of significant findings concerning between gender differences may be due, in part, to the relatively small sample size resulting in lack of
statistical power. Furthermore, gender differences in PTSD may be related to higher rates of premorbid psychopathology (Tolin & Foa, 2006). Research has found that girls exhibit higher levels of negative affect, anxiety, and depression than boys (Kilpatrick et al., 2000; McCrae et al., 2002). As such, the higher rates of PTSS in girls may be the consequence of premorbid psychopathology. The present study was unable to assess prior psychopathology in the child. Future research should examine the impact of pre-existing psychopathology in the development and maintenance of child PTSD.

Additional variables that were not assessed may also play a role in gender differences in PTSD. For instance, women have been shown to report greater peritraumatic and acute dissociation than men (e.g., Bryant & Harvey, 2003; Fullerton et al., 2001) and those women who report peritraumatic dissociation have been found to be more than seven times more likely to develop PTSD than men who report peritraumatic dissociation (Fullerton et al., 2001). Peritraumatic symptoms such as cognitive appraisals and peritraumatic dissociation, may differ in men and women. These psychological differences in conjunction with differing physiological responses may potentially account for gender-related differences in the development of PTSD (Olfß, Langeland, Draijer, and Gersons, 2007). Future research should examine peritraumatic dissociation and peritraumatic symptoms, such as cognitive appraisals, in children in order to further examine potential gender difference in childhood PTSD.
Impact of Additional Variables in the Development of Child PTSD

The present study used multisample analyses to examine the impact of caregiver PTSD and PTSD symptoms in the development of child 2-week and 6-week PTSS. In-hospital levels of caregiver PTSD and hyperarousal symptoms were hypothesized to moderate the relationship between child in-hospital PTSS and subsequent PTSD. However, the models were found to be a poor fit to the data suggesting that caregiver in-hospital PTSD and caregiver hyperarousal symptoms did not moderate the relationship between child in-hospital PTSD symptoms and subsequent PTSD. Lack of significant findings may be due to a decrease in statistical power resulting from the relatively small sample size. The present study proposed to recruit 120 participants; however, due to the logistics in recruitment only 118 children and their caregivers were included in the final sample. However, it is unlikely that the lack of two dyads was responsible for the observed nonsignificant findings. Further, due to prior research implicating parental distress in the development of child PTSD, the present study chose to focus specifically on PTSD symptoms and depression. Additional variables that were not assessed in the current study might be impacting the development of child PTSS thereby resulting in the lack of significant findings. For instance, family environment may be moderating the impact of child in-hospital symptoms on the development of PTSD in children.

The present study included children from a very large age range (8 – 18 years). Although age was not found to be significantly related to child post-traumatic distress, there are likely age-related differences in the development and maintenance of child PTSS. Younger children are particularly dependent on adults for their ability to talk about
and cope with their traumatic event (Fivush, 1998; Mash & Terdal, 1997) and model adult behavior in their expression of emotion (Eisenberg, Fabes, & Murphy, 1996). During childhood, emotional-regulation and monitoring of one’s own behaviors shifts from external sources, such as parents, to more internalized sources (Eisenberg, 1998). Caregivers can help manage a child’s emotions through detection and monitoring of the child’s distress, selecting appropriate environments for the child, and by providing information, such as facial cues and narratives, to help the child interpret his/her own experiences (Eisenberg, 1998). Furthermore, family cohesion (Conte & Schuerman, 1987) and family help-seeking behaviors (Waterman, 1993) have been strong predictors of outcome following child abuse. The nature of parent-child conversations can also influence the child’s memory of the traumatic experience and the child’s ability to cope appropriately (Farrar, Fasig, & Welch-Ross, 1997; Harley & Reese, 1999; Reese & Fivush, 1993). Appropriate conversations with caregivers can provide the child with examples as to how appraise and interpret his/her traumatic experience, correct misconceptions, help the child manage and regulate emotions, and provide information concerning coping strategies (Salmon & Bryant, 2002). The discrepancy between caregiver and child perceptions may play a negative role in the development of child PTSD. Lack of communication may cause the trauma victim to feel misunderstood which may, in turn, exacerbate child posttraumatic distress.

Results of the current study suggest that caregiver avoidance can have a significant, negative impact on child posttraumatic distress. Caregiver avoidance may not allow for the identification and processing of the child’s distress. Whereas an adult can
engage in avoidant thoughts and behaviors largely independently, oftentimes a child’s ability to discuss or avoid traumatic reminders depends on parental behavior. Caregiver avoidance may not allow for the child or parent to confront and resolve his/her own anxieties, which may increase his/her sensitivity to future traumatic events and maintenance of current psychological symptoms (Best et al., 2001; McFarlane, 1987; Smith et al., 2001). The potentially negative impact of caregiver avoidance may be particularly true for younger children who are more reliant on external sources of support.

**Prior Trauma History**

Prior trauma history has consistently been found to be a risk factor for PTSD in both children and adults. In the present study, exclusion of those children with prior trauma history resulted in a decrease in rates of PTSD in both the children and caregivers and the correlation between child and caregiver PTSS became nonsignificant at 6-week post-trauma. However, exclusion of prior trauma history did not significantly impact the structural models. The lack of significant findings concerning prior trauma history may be due to range restrictions in PTSD symptomatology. As mentioned, rates of 2-week PTSD decreased after the removal of those children with a prior trauma history and no child or caregiver reported at least subthreshold PTSD at 6-weeks post-trauma. Further, approximately 50% of the child trauma victims reported a prior trauma history which may have resulted in a decrease in statistical power that was needed to detect significant results.

In the current study, exclusion of those children with a prior trauma history did not significantly influence the results. However, prior trauma history has been found to
be one of the most consistent predictors of PTSD following exposure to a subsequent trauma (Ozer et al., 2003). One mechanism through which prior trauma experiences could increase risk for subsequent PTSD is that prior stressful life events may result in persistent biological changes that could increase one’s risk of developing PTSD upon exposure to a subsequent stressor. The present study was unable to examine the impact of physiological responses and prior trauma on the development of child PTSD. Future studies should further examine the impact of prior trauma history and the potential impact of biological responses on the development of PTSD.

**PTSD and Depression**

Prior studies have found depressive symptoms to be related to the persistence of posttraumatic stress symptoms (Roussos, Goenjian, Steinberg, Sotiropoulou, Kakaki, Kabakos, et al., 2005; Goenjian, Karayan, Pynoos, Minassian, Najarian, Steinberg, Fairbanks, 1997), may lead to more serious subsequent depressive disorders (Aalto-Setälä, Marttunen, Tuulio-Henriksson, Poikolainen, & Lönnqvist, 2002), and can have a detrimental effect on the child’s psychosocial functioning and self-esteem (Aronen & Soininen, 2000). In the current study, pediatric trauma victims were found to report high levels of depression. Furthermore, results of epidemiological studies indicate that depressive disorders show a change in gender distribution after puberty, when the rates for girls begin to exceed those for boys (Costello, 1989). Results of the current study suggest higher rates of PTSS in girls than boys. However, gender differences concerning depressive symptoms were only found with regards to in-hospital symptoms of depression. Examination of the development of child PTSD symptoms in particular
revealed that child in-hospital symptoms of PTSD significantly impacted the development of subsequent PTSS specifically but not also depressive symptoms.

Interestingly, high levels of caregiver in-hospital depressive symptoms interacted with low levels of child in-hospital depression to predict child PTSS 2-weeks following the child’s traumatic event. Depressed parents may utilize more maladaptive cognitive styles, which, in turn, are modeled by their children following their traumatic event (Meisser-Stedman et al., 2006). These high levels of depressive symptoms underscore the need to evaluate children and caregivers for depression and to plan for the provision of specific interventions aimed at treating depression and PTSD.

**Implications for the Treatment of PTSD Symptoms in Children**

Knowledge of specific post-traumatic symptoms in both the caregiver and child that lead to increased risk for child PTSD status may lead to the development of novel early interventions targeting those families at risk for developing PTSD. Interventions directed toward familial responses, particularly hyperarousal and avoidance symptoms, may hold promise, especially in female trauma victims. Assessment and monitoring of specific PTSD symptoms and depressive symptomatology can provide a useful means of monitoring progress and accordingly adjust the emphasis of intervention strategies. Results implicate hyperarousal symptoms in the development of child 2-week PTSS. Interventions targeting hyperarousal symptoms may help decrease a child’s risk for developing Acute Stress Disorder (ASD) and PTSD. Avoidance symptoms should also be assessed as results suggest that in-hospital levels of avoidance played a significant role in the development of child PTSS. Children are at greatest risk for developing subsequent
PTSS if the child and/or caregiver engage in avoidant strategies. Caregivers may be ambivalent about seeking treatment for themselves or their child for fear of upsetting the child. In treatment, the tendency to avoid distressing traumatic thoughts and/or reminders should be addressed and normalized for caregivers; however, interventions should address the possible negative consequences of avoidance in the longer term.

The results of the current study are consistent with prior studies suggesting that acute intervention techniques that may increase hyperarousal, such as debriefing, can be detrimental to the child’s post-traumatic recovery (Rose, Brewin, Andres, & Kirk, 1999; for reviews, see Litz, Gray, Bryant, and Adler, 2002, as cited in Ruzek and Watson, 2001; Rose, Wessely, and Bisson, 2001). However, allowing the child to avoid processing his/her traumatic event can negatively impact post-traumatic adjustment. Future research that involves frequent assessment of both child and caregiver PTSS is needed in order to determine at what point interventions that may increase hyperarousal, such as debriefing or prolonged exposure, may be beneficial in the treatment of PTSD.

**Limitations and Areas for Future Research**

The current study was limited by a relatively small sample size of moderately injured trauma victims. Therefore, the present results may not generalize to more symptomatic trauma victims. Many of the findings, particularly with multisample analyses, were close to significance (p< .08). However, due to concerns about the number of analyses conducted and the risk of capitalizing on error, significance was defined as less than or equal to .05. Future studies are needed examining these relationships with a larger sample size which would afford greater statistical power needed to detect
significant results. Furthermore, nonsignificant findings may be partially due to the current sample consisting of less severely injured participants who were admitted to the Emergency Department (ED). Prior studies have typically examined children who may have been more seriously injured and who were considered medical traumas resulting in admittance to the trauma unit. Typically, when children are admitted to the trauma unit their length of hospital stay is longer than for a child who is admitted to the ED. This may result in the child experiencing an “on-going” trauma in which they are repeatedly exposed trauma-related reminders, such as conversations about the event and numerous medical procedures. The medical procedures can be conceptualized as further discrete, potentially traumatizing experiences or as a continuation of the initial trauma.

Given the low rates of PTSD in the present sample, PTSD was assessed as a continuous variable. Diagnostic levels of PTSD are relatively low in child ED samples, although subthreshold PTSD is more common (Kassam-Adams et al., 2005). Therefore, the present findings may not generalize to more severely traumatized individuals. However, prior research has demonstrated that subthreshold PTSD is often associated with clinically significant levels of impairment (Carlier & Gersons, 1995), underscoring the importance of identifying victims who may not meet full diagnostic criteria, but report subthreshold levels of symptoms. The present study proposed to recruit 120 children and their primary caregivers; however, due to lack of research assistants who were able to recruit, the final sample totaled 118 participants. Although it is unlikely that the lack of two dyads was driving nonsignificant findings, insufficient power cannot be ruled out as a possible explanation. Finally, the PTSD and depression measures used
were self-report measures which may be influenced by either the over- or underreporting of symptoms.

Despite these limitations, the results of the present study highlight the importance of assessing specific PTSD symptom clusters and caregiver distress following a child’s traumatic event. A better understanding of the relationship between early child distress symptoms and persistent posttraumatic distress in pediatric injury victims can increase medical professionals’ ability to assess child trauma victims’ mental health and needs. The detection of early indicators of child distress can be used in the development of effective methods of assessment and intervention for childhood PTSD.

Future research is needed to develop effective screeners for child and caregiver PTSS. Currently, few screeners that identify children and/or families at risk for developing PTSD have high levels of specificity and sensitivity. Furthermore, the current study demonstrates the need for the assessment of both the caregiver and child in the identification of at risk individuals. Prior research on child PTSD has focused primarily on children and their biological mothers. Future research should examine the impact of paternal and sibling responses on child post-traumatic adjustment. Inclusion of additional family members may also assist in the identification of familial risk and resilience factors and aid in the development of more family-focused interventions. Future studies should also examine age-related differences in the proposed model with a larger sample size. To further examine the impact of familial distress on child post-traumatic adjustment, measures of familial functioning, such as parent-child communication and emotion versus problem-focused coping should be included. Further, age may interact with
variables of interest differentially for boys and girls and may be further complicated by
the gender of the parent.

Presently, there are few family-focused interventions for PTSD that are
administered in the acute aftermath of a child’s traumatic event. The present study
reinforces the importance of examining specific PTSD symptom clusters in a family-
focused manner. Specific attention should be given to avoidance symptoms as child and
caregiver avoidance symptoms were found to significantly impact child post-traumatic
adjustment. Future interventions should focus on decreasing familial avoidance and
improving appropriate, supportive communication within the family. Furthermore, it may
be beneficial for children to learn skills, such as emotional regulation, to help decrease
their arousal in the acute aftermath of their trauma. Based on research findings of acute
hyperarousal symptoms and heightened physiological response predicting subsequent
PTSS, psychopharmacological studies have begun to examine the effectiveness of
propranolol, a beta-blocker that block postsynaptic norepinephrine receptors, in
decreasing the risk of developing PTSD in adults (Pitman et al., 2002). Currently, only
one study has examined the efficacy of propranolol in decreasing risk for PTSD in
children (Nugent, Ostrowski, Christopher, Luzader, & Delahanty, under review). Results
of this recent pilot study of propranolol in children suggests significantly fewer
symptoms of PTSD in boys in the propranolol condition relative to boys in the placebo
condition. In contrast, girls in the propranolol condition reported significantly higher
rates of PTSD symptom severity than girls in the placebo condition. However, this study
was conducted with a relatively small sample size (Nugent et al., under review). Given
prior findings of the impact of parental distress on child post-traumatic adjustment, the current study chose to specifically focus on family factors with the hopes of identifying variables that can lead to the development of acute, family-oriented interventions. Future studies should examine alternative models that include both biological and psychological variables in the development and maintenance of child PTSS. Research is needed examining the impact of physiological interventions, such as propranolol, in addition to psychological, family-oriented treatments in the acute aftermath of a child’s traumatic event.
REFERENCES


APPENDIX A.

BIVARIATE CORRELATIONS BETWEEN CHILD PTSS AND PTSD SYMPTOMS CLUSTERS AT EACH TIME-POINT
<table>
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*** p < .001, ** p < .01, * p < .05
APPENDIX B

BIVARIATE CORRELATIONS BETWEEN CAREGIVER PTSS AND PTSD SYMPTOMS CLUSTERS AT EACH TIME-POINT
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<tr>
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<td>26*</td>
<td>30**</td>
<td>27*</td>
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<td>0.56</td>
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<td>30**</td>
<td>28**</td>
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<td>28**</td>
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*** p < .001, ** p < .01, * p < .05
APPENDIX C

BIVARIATE CORRELATIONS BETWEEN CHILD AND CAREGIVER PTSD SYMPTOM CLUSTERS.
<table>
<thead>
<tr>
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<th>In-hospital Caregiver Avoidance</th>
<th>In-hospital Caregiver Re-experiencing</th>
<th>In-hospital Caregiver PTSD</th>
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<th>2-week Caregiver Avoidance</th>
<th>2-week Caregiver Re-experiencing</th>
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<th>6-week Caregiver PTSD</th>
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<td>-0.03</td>
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<td>0.31**</td>
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<td>0.46***</td>
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<td>0.01</td>
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<td>0.07</td>
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<td>** - 0.30</td>
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<td>-0.16</td>
<td>0.07</td>
<td>*** - 0.41</td>
<td>*** - 0.38</td>
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<td>-0.05</td>
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<td>0.54**</td>
<td>-0.07</td>
<td>*** - 0.35</td>
<td>24**</td>
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<tr>
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<td>0.19</td>
<td>0.14</td>
<td>0.19</td>
<td>-0.09</td>
<td>** - 0.33</td>
<td>-0.04</td>
<td>-0.12</td>
<td>0.49**</td>
<td>0.11</td>
<td>** - 0.31</td>
<td>26**</td>
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***p ≤ 0.001, **p ≤ 0.01, *p ≤ 0.05
APPENDIX D

DEVELOPMENT OF CHILD 6-WEEK PTSS
** p ≤ .01
APPENDIX E

DEVELOPMENT OF CHILD 2-WEEK PTSS
EXCLUDING CHILDREN WITH A PRIOR TRAUMA HISTORY
*** p ≤ .001, ** p ≤ .01, * p ≤ .05
APPENDIX F

DEVELOPMENT OF CHILD 6-WEEK PTSS EXCLUDING CHILDREN WITH A PRIOR TRAUMA HISTORY
** p≤ .01, *p≤ .05
APPENDIX G

DEVELOPMENT OF CHILD 2-WEEK PTSS EXCLUDING THOSE DYADS WHERE CAREGIVER WITNESSED CHILD’S TRAUMA
*** $p < .001$
APPENDIX H

DEVELOPMENT OF CHILD 6-WEEK PTSS EXCLUDING THOSE DYADS WHERE CAREGIVER WITNESSED CHILD’S TRAUMA
*p<.05
APPENDIX I

CONSENT FORM CAREGIVER
Project Title: Examination of Parent and Child PTSD following Pediatric Injury

Investigators: Sarah Ostrowski, M.A., Kent State University
Norman C. Christopher, MD, Children’s Hospital Medical Center of Akron
Douglas L. Delahanty, PhD, Kent State University

INTRODUCTION: You are being asked to participate as one of approximately 120 subjects in a research study examining children’s responses to accidents. Subjects will consist of children involved in events requiring them to be seen at the Emergency Department at Akron Children’s Hospital and their parents. We have previously found that parent and child initial thoughts, feelings, and behaviors can predict later well being, and we would like to examine your and your child’s initial and later responses to your child’s event.

YOUR PARTICIPATION: If you decide to take part in this study, one of the members of our research team will ask you and your child a few questions now (this will take approximately 20 minutes), and we will meet with you both again 2 and 6 weeks from now. These meetings will last approximately 1 hour each and will be scheduled at a convenient time in your home. Today we will ask your child about what he/she remembers about the accident and about feelings that they may be experiencing. We will also ask you about your own thoughts and feelings concerning your child’s injury. During the follow-up sessions we will also ask you both to complete various questionnaires and to participate in an interview designed to measure your thoughts, feelings, and reactions to your child’s accident. To ensure that we don’t miss anything, you and your child’s answers will be audiotaped. You will be given the opportunity to listen to the tape after the interview is concluded. We will also need to look at your child’s medical records to determine what specific injuries he/she may have suffered in their accident. Child’s height, weight, length of present hospital stay, time of admission and discharge, Glasgow Coma Scale (GCS) score, any medications that were administered during the child’s hospital stay, blood alcohol levels, chronic diseases, and injury severity scores (ISS) will be recorded from the child’s medical chart. By signing below, you are giving us permission to look at these records.

If you and/or your child decide not to participate in this research study, your child will receive all of the evaluation, treatment, and follow-up care that is required of your child’s illness or injury, according to the usual treatment protocols in the Emergency Department. If you/your child decide to participate in this research study but change your mind at a later date, you/your child may withdraw from the study at any time without any penalties or other consequences whatsoever.

It is possible that we will learn new information about how children respond to a traumatic event while conducting this study. You will be informed by one of the investigators of any new findings that might affect you or your child’s health in the future, as it relates to participating in this research study.

BENEFITS: You and your child may not receive any direct benefit from your participation in this study. Your participation in this study may enable us to help future accident victims. Any child or parent experiencing persistent distress or depression will receive an appropriate referral.

_________ Participant’s initials _________ Date
RISKS: Some of the questions we ask will require you and your child to remember aspects of the accident, and this may lead to increases in distress. The long-term effects of discussing traumatic memories are unknown, but it is possible that some of the questions may provoke stressful memories. However, recent research has shown that child accident victims who talk about their accident experience are likely to experience lower distress than victims that did not talk about their accident. If any part of the study causes your child to become distressed (symptoms of distress and/or depression include sleep disruption, concentration problems, changes in appetite, and similar disruptions in normal functioning), please call Dr. Norman Christopher at (330) 543-8452 for an appropriate referral during office hours. After office hours you can call the Pediatric Psychiatry Clinic at Children’s Hospital at 800-262-0333 ext. 38598.

Agency Contact information: If you feel upset or experience psychological problems, there are several centers at Summa Health System that can help you. Below is a list of several centers that you can contact. This list will also be provided when you quit or complete this study.

<table>
<thead>
<tr>
<th>Center</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summa Health System-Kent State University</td>
<td>St. Thomas Hospital</td>
<td>330-379-5094</td>
</tr>
<tr>
<td>Center for the Study and Treatment of Traumatic Stress</td>
<td>444 N. Main St. Akron, OH 44310</td>
<td></td>
</tr>
<tr>
<td>Department of Psychiatry</td>
<td>St. Thomas Hospital</td>
<td>330-379-5167</td>
</tr>
<tr>
<td></td>
<td>444 N. Main St. Akron, OH 44310</td>
<td></td>
</tr>
</tbody>
</table>

CONFIDENTIALITY: All data collected in this study will be kept strictly confidential within the limits of the law. This means that your family’s data will only be revealed in response to an attorney’s subpoena. You should understand that there are certain legal limits to confidentiality. If you reveal suicidal or homicidal feelings or that a child or fetus (if pregnant) or elderly person in the victim of abuse, actions may be taken to protect others. The information you provide us with will be identified only by a subject number, and will be examined only by Dr. Delahanty and qualified members of his research team. The only copies of the data will remain in a locked file. After the study, data will be published in scientific journals, but data will not be published in any manner that can identify you or your child.

VOLUNTARY PARTICIPATION: Your participation in this study is voluntary and you may decline to participate in it without loss of any future services or benefits to which you may be entitled. Should you choose to participate, you may voluntarily withdraw from it at any time. By signing this form you are indicating that you have been informed about the research study in which you are agreeing to participate, and have had all of your questions satisfactorily answered. You will receive a copy of this form for your records.

_________ Participant’s initials  _________ Date
**RESEARCH-RELATED INJURIES:** You should also be aware that there are no Federal, State or private programs established to provide research subjects with compensation and/or medical treatment or other financial losses due to physical injuries resulting from research procedures such as the one in which you are being asked to participate.

**COSTS:** You are not responsible for any costs above those of your child’s standard or routine care. Twenty dollars at each session ($60.00 total) will be provided to your family to compensate you for your time.

**QUESTIONS:** If you have any questions now, during or following your participation regarding this study and its associated risks, please contact Douglas L. Delahanty at (330) 672-2395. If you have questions about Children’s Hospital’s rules for research, please call the Children’s Hospital’s Institutional Review Board, telephone (330) 543-8725. For questions about Kent State University’s rules for research, you may contact Dr. John West, Dean, Division of Research and Graduate Studies, telephone (330) 672-2851.

**SIGNATURE LINES:** By signing this form I acknowledge that the study has been explained to me, I understand it, and have had any questions regarding the risks and benefits of this study satisfactorily answered. I agree to allow my child to participate in the study. I understand that I will be given a copy of this consent for my records. Further, I realize that by signing this form I do not waive any of my legal rights.

Date: ___________  Parent Signature: _______________________

Date: ___________  Witness Signature: _______________________

APPENDIX J

CONSENT FORM - CHILD
**Project Title:** Examination of Parent and Child PTSD following Pediatric Injury

**Investigators:** Sarah Ostrowski, M.A., Kent State University  
Norman C. Christopher, MD, Children’s Hospital Medical Center of Akron  
Douglas L. Delahanty, PhD, Kent State University

**INTRODUCTION:** We would like you to take part in a study to learn about children like you who have come to the hospital. We are studying approximately 120 children like you. We are also interested in asking your parents some questions. We have studied other children and adults and found that their thoughts, feelings, and behaviors are related to how you feel after your accident, and we want to see if this is true for other children also.

**YOUR PARTICIPATION:** If you decide to take part in this study, one of the members of our research team will ask you a few questions now about your accident and some feelings that you may be experiencing. These questions will take about 15-20 minutes. We will also ask your parent(s) similar questions. We will look at your hospital records to see how you were hurt, what kind of injuries you have, and to look at other test results. By signing below, you are saying it is okay for us to look at these records. In 2 weeks and 6 weeks from now, we would like to talk with you and your parent(s) again, at your house. We will ask you some questions about how you both have been feeling since your accident. This meeting will take approximately 1 hour, and to make sure that we don’t miss your answers, we will tape them.

If you decide **not** to participate in this study, you will receive all of the evaluation, treatment, and follow up care that is required for your illness or injury, according to the usual treatment protocols in the Emergency Department. If you decide to participate in this research study but change your mind at a later date, you may withdraw from the study at any time without penalties or other consequences whatsoever.

It is possible that we will learn new information while conducting this study. You and your family will be informed by one of the investigators of any new findings that might affect you or your health in the future.

**BENEFITS:** Talking about events like yours can make people feel better. By participating, you may help us to help other people like you. Also, if you are feeling upset, we can give you a number of someone to call.

**RISKS:** We will ask you to remember your accident and tell us about it. This may make you upset. If any part of the study causes you to feel upset please call Dr. Norman Christopher at (330) 543-8452 for someone to talk to during office hours. After office hours you can call the Pediatric Psychiatry Clinic at Children’s Hospital at (330) 543-3785. It is possible that participating in this series of interviews might affect you in ways that we can’t anticipate – in any case, we will remain available to help you by making referrals to other specialized doctors if that is necessary.

_______ Parent’s Initials     _______ Date
CONFIDENTIALITY: Most of the information that you give us will be kept private and other people not involved in the study will not be able to see your information. The only information that will be accessible to your parents will be the information you provide us concerning your thoughts and feelings about the accident. This information will be tape recorded and your parents will be given the opportunity to listen to the tape if they so choose. If you are having problems with stress from the accident, we will give phone numbers to your parents so that they can look into contacting someone who can help you. Outside of what is tape recorded, we will not share what you tell us with anyone else, including your parents. The only exception would be if you were to tell us that you were in some kind of danger, and in that case of course we would try to help you. Beyond that, whatever you say is private and your name will not be placed on any of the forms.

VOLUNTARY PARTICIPATION: It is okay for you to say you do not want to do this study, and if you say no, it will not affect any of your medical treatment. You can also quit at any time if you start to feel upset.

COSTS: Doing this study will not cost you any money more than your medical care. Twenty dollars at each session ($60.00 total) will be provided to your family for your time.

QUESTIONS: If you have any questions about the study, please contact Douglas L. Delahanty at (330) 672-5285. If you have any questions about Children’s Hospital’s rules for research, please call the Children’s Hospital Institutional Review Board, telephone (330) 543-8725. For questions about Kent State University’s rules for research, you may contact Dr. John West, Dean, Division of Research and Graduate Studies, telephone (330) 672-2851.

SIGNATURE LINES: By signing this form I’m saying that I understand this study and that any questions I had have been answered. I will keep a copy of this form.

Date: _______________ Child Signature: ________________________________

Date: _______________ Witness Signature: ________________________________
APPENDIX K

RESEARCH ASSISTANT SCRIPT FOR CAREGIVERS
Hello ________

My name is _____________. We are doing a study with Kent State University in which we are interested in trying to determine ways in which we can predict children and their parents who may have trouble adjusting following an event like your child has experienced. After an event like this, approximately 15% of children and 25% of parents develop Posttraumatic Distress Disorder (PTSD) and other related disorders. **So it is important to realize that only a minority of individuals develop PTSD following a traumatic event.** We are interested in seeing whether we can predict who is most likely to have a hard time adjusting so that we can develop ways to help these individuals.

For this study we will first ask your child a few questions about how he/she felt when they got hurt. After I ask him/her these questions, I may ask you and your child a few more questions about how you both feel. If you or your child do not feel like answering the questions, that is fine and it is okay if you or your child do not want to do the study. These initial questions will determine whether you are eligible to participate.

If you decide to do the study, we will ask you a few additional questions today and then meet with you both again in 2 and 6 weeks from now. These meetings will last approximately 1 hour each and will be scheduled at a convenient time in your home.

Is it okay for me to ask your child a few questions?

If yes, then proceed with the child script and screener questions.
If no, thank the parents for their time and complete the rejection form.
APPENDIX L

SCREENER – CHILD
Undergraduate Research Script (for child)

Hello ______:

My name is _____ and we are doing a study about kids like you. We want to see how kids and their parents feel after something happens that makes them come to the hospital.

I am first going to ask you a few questions about how you felt when you got hurt. It will only take a few minutes. After I ask you these questions, I may ask you and your parent(s) a few more questions about how you both feel. If you do not feel like answering the questions that is fine, and it is okay if you do not want to do the study.

Is it okay for me to ask you a few questions?

If yes, administer the screener questions.

Screener Questions

During your injury:

1. Did you think that your life was in danger or that you might die?
   ______Yes      ______No

2. Did you think that someone else’s life was in danger?
   ______Yes      ______No

3. When you got hurt, or right afterwards, did you feel afraid?
   ______Yes      ______No

4. Did you feel helpless (believe that there was nothing you could do)?
   ______Yes      ______No

If the child answers yes to question #1 or #2 and yes to at least 1 of the remaining questions (#3-4), gain consent from both the parent and child. After you have consent from the parent and child, administer the questionnaires.
APPENDIX M

DEMOGRAPHIC INFORMATION
Demographic Information

Child’s Birthdate: ______________

Your Relationship to this Child:
__Mother (Biological or adoptive)  __Father (Biological or adoptive)
__Step-mother  __Step-father
__Other (please describe): _____________

Your Current Marital Status:
__Married  __Separated
__Divorced  __Never Married
__Widow/er

Currently, who lives at home with your child (e.g., parents, siblings)
   Relationship to child   Age
1.
2.
3.
4.
5.
6.

Ethnicity (please circle all that apply):
1. African American
2. Asian American
3. Caucasian
4. Hispanic/Latin American
5. Native American
6. Other ______________________

How would you characterize your current area of residence?
1. Rural community
2. Small town
3. Suburban neighborhood
4. Urban neighborhood
5. Other ______________________

Primary caregiver(s) for child more than 20% of the time (i.e., adoptive parents, day care, married biological parents, single mother/father, mother/father and significant other, grandparents, etc.). Please list all.

___________________________________________________________________
___________________________________________________________________
What is the highest educational level for either parent/guardian?
1. Elementary
2. Jr. High
3. GED
4. High School
5. Trade School (Years beyond HS: ____________)
6. Some College or 2-year Degree
7. 4 Year Degree
8. Advanced College Degree
9. Other (specify _________________________)

Approximate parental combined income?
1. Under $10,000/year
2. $10,000 – $15,000/year
3. $15,000 – $20,000/year
4. $20,000 – $30,000/year
5. $30,000 – $40,000/year
6. $40,000 – $50,000/year
7. $60,000 – $70,000/year
8. Over $70,000/year

Parental occupations:
1. Mother________________________________________
2. Father__________________________________________
3. Step-parent______________________________________
4. Other__________________________________________

In the past 6 months, have you or your partner sought professional assistance from any of the following?

<table>
<thead>
<tr>
<th></th>
<th>Self</th>
<th>Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychologist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatrist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counselor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Worker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other professional</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If yes, please specify
________________________________________________________________________
________________________________________________________________________

Were there any problems experienced during the pregnancy?
______Yes   _________No
If yes, please specify
________________________________________________________________________
________________________________________________________________________

Was there a use of alcohol, cigarettes, or medications during the pregnancy?
_______Yes __________No

If yes, please specific
________________________________________________________________________
________________________________________________________________________

How much time did your child generally spend on homework (before the accident)?
  1. More than a few hours daily
  2. One or two hours a day
  3. A few hours a week
  4. A few hours a month
  5. Little to no time

How much time does your child generally spend on homework (after the accident)?
  1. More than a few hours daily
  2. One or two hours a day
  3. A few hours a week
  4. A few hours a month
  5. Little to no time

Please indicate whether your child’s school performance (after the accident) has:
  1. Improved
  2. Worsened
  3. Remained the same
  4. Don’t know

Please indicate how your child’s overall ability to accomplish previous normal tasks such as work, play, eat, sleep, completion of chores, and interaction with friends or family has changed since the accident:
  1. Improved
  2. Worsened slightly
  3. Worsened greatly
  4. Remained the same
  5. Don’t know

Have you noticed any changes in your child’s behavior? Yes _____ No _____ If so, please briefly describe:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
APPENDIX N

IMPACT OF EVENT SCALE (IES-R)
Below is a list of comments made by people after stressful life events. Please check each item, indicating how frequently these comments were true for you **SINCE YOUR INJURY**. If they did not occur during that time, please mark the “not at all” column.

Please think of your car accident when filling out this questionnaire.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Not at all</th>
<th>A little bit</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Any reminder brought back feelings about it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>I had trouble staying asleep</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Other things kept making me think about it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>I felt irritable and angry</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>I avoided letting myself get upset when I thought about it or was reminded of it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>I thought about it when I didn't mean to</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>I felt as if it hadn't happened or wasn't real</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>I stayed away from reminders about it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Pictures about it popped into my mind</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>I was jumpy and easily startled</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>I tried not to think about it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>I was aware that I still had a lot of feelings about it, but I didn't deal with them</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>My feelings about it were kind of numb</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>I found myself acting or feeling like I was back at that time</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>I had trouble falling asleep</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
<td>A little bit</td>
<td>Moderately</td>
<td>Quite a bit</td>
<td>Extremely</td>
<td></td>
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<td>-------------</td>
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<td>-----------</td>
<td></td>
</tr>
<tr>
<td>16. I had waves of strong feelings</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>17. I tried to remove it from my memory</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>18. I had trouble concentrating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>19. Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>20. I had dreams about it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>21. I felt watchful and on-guard</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>22. I tried not to talk about it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
Below is a list of comments made by people after stressful life events. Please check each item, indicating how frequently these comments were true for you **SINCE YOUR CHILD’S INJURY**. If they did not occur during that time, please mark the “not at all” column.

Please think of your car accident when filling out this questionnaire.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
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<tbody>
<tr>
<td>1. Any reminder brought back feelings about it</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I had trouble staying asleep</td>
<td>0</td>
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</tbody>
</table>
APPENDIX O

CLINICIAN ADMINISTERED PTSD SCALE FOR CHILDREN AND ADOLESCENTS (CAPS-CA)
The CAPS-CA is a clinician-administered interview that assesses DSM-IV symptoms of PTSD and is completed by a clinician who adapt interview questions to the developmental and cognitive level of the child. Provided below is the summary sheet for responses to tailored questions about PTSD symptoms (please note that each symptom is coded from 0-4 for intensity and frequency of the symptom):

A. Traumatic Event:

B. Reexperiencing Symptoms:
   1. intrusive recollections
   2. distressing dreams
   3. acting or feeling as if event were recurring
   4. psychological distress at exposure to cues
   5. physiological reactivity on exposure to cues

C. Avoidance and numbing symptoms
   6. avoidance of thoughts, feelings, or conversations
   7. avoidance of activities, places, or people
   8. inability to recall important aspects of trauma
   9. diminished interest or participation in activities
   10. detachment or estrangement
   11. restricted range of affect
   12. sense of foreshortened future

D. Hyperarousal symptoms
   13. difficulty falling or staying asleep
   14. irritability or outbursts of anger
   15. difficulty concentrating
   16. hypervigilance
   17. exaggerated startle response

F. Significant distress or impairment in functioning
   18. overall distress
   19. impairment in social functioning
   20. impairment in scholastic functioning
   21. impairment in developmental functioning
APPENDIX P

CLINICIAN ADMINISTERED PTSD SCALE (CAPS)
The CAPS is a clinician-administered interview that assesses DSM-IV symptoms of PTSD. Provided below is the summary sheet for responses to tailored questions about PTSD symptoms (please note that each symptom is coded from 0-4 for intensity and frequency of the symptom):

A. Traumatic Event:

B. Reexperiencing Symptoms:
1. intrusive recollections
2. distressing dreams
3. acting or feeling as if event were recurring
4. psychological distress at exposure to cues
5. physiological reactivity on exposure to cues

C. Avoidance and numbing symptoms
6. avoidance of thoughts, feelings, or conversations
7. avoidance of activities, places, or people
8. inability to recall important aspects of trauma
9. diminished interest or participation in activities
10. detachment or estrangement
11. restricted range of affect
12. sense of foreshortened future

D. Hyperarousal symptoms
13. difficulty falling or staying asleep
14. irritability or outbursts of anger
15. difficulty concentrating
16. hypervigilance
17. exaggerated startle response

F. Significant distress or impairment in functioning
18. overall distress
19. impairment in social functioning
20. impairment in scholastic functioning
21. impairment in developmental functioning
APPENDIX Q

CHILD DEPRESSION INVENTORY (CDI)
Kids sometimes have different feelings and ideas.

This form lists the feelings and ideas in groups. From each group of three sentences, pick one sentence that describes you best for the past two weeks. After you pick a sentence from the first group, go on to the next group.

There is no right answer or wrong answer. Just pick the sentence that best describes the way you have been recently. Put a mark like this X next to your answer. Put the mark in the box next to the sentence that you pick.

*Remember, pick out the sentences that describe you best in the PAST TWO WEEKS.*

### Item 1

- □ I am sad once in a while.
- □ I am sad many times.
- □ I am sad all the time.

### Item 6

- □ I think about bad things happening to me once in a while.
- □ I worry that bad things will happen to me.
- □ I am sure that terrible things will happen to me.

### Item 2

- □ Nothing will ever work out for me.
- □ I am not sure if things will work out for me.
- □ Things will work out for me O.K.

### Item 7

- □ I hate myself
- □ I do not like myself.
- □ I like myself.

### Item 3

- □ I do most things O.K.
- □ I do many things wrong.
- □ I do everything wrong.

### Item 8

- □ All bad things are my fault.
- □ Many bad things are my fault.
- □ Bad things are not usually my fault.

### Item 4

- □ I have fun in many things.
- □ I have fun in some things.
- □ Nothing is fun at all.

### Item 9

- □ I do not think about killing myself.
- □ I think about killing myself but I would not do it.
- □ I want to kill myself.
<table>
<thead>
<tr>
<th>Item 5</th>
<th>Item 10</th>
</tr>
</thead>
</table>
| □ I am bad all the time.  
□ I am bad many times.  
□ I am bad once in a while. | □ I feel like crying every day.  
□ I feel like crying many days.  
□ I feel like crying once in a while. |

<table>
<thead>
<tr>
<th>Item 11</th>
<th>Item 18</th>
</tr>
</thead>
</table>
| □ Things bother me all the time.  
□ Things bother me many times.  
□ Things bother me once in a while. | □ Most days I do not feel like eating.  
□ Many days I do not feel like eating.  
□ I eat pretty well. |

<table>
<thead>
<tr>
<th>Item 12</th>
<th>Item 19</th>
</tr>
</thead>
</table>
| □ I like being with people.  
□ I do not like being with people many times.  
□ I do not want to be with people at all. | □ I do not worry about aches and pains.  
□ I worry about aches and pains many times.  
□ I worry about aches and pains all the time. |

<table>
<thead>
<tr>
<th>Item 13</th>
<th>Item 20</th>
</tr>
</thead>
</table>
| □ I cannot make up my mind about things.  
□ It is hard to make up my mind about things.  
□ I make my mind up about things easily. | □ I do not feel alone.  
□ I feel alone many times.  
□ I feel alone all the time. |
<table>
<thead>
<tr>
<th>Item 14</th>
<th>Item 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ I look O.K.</td>
<td>□ I never have fun at school.</td>
</tr>
<tr>
<td>□ I there are some bad things about my looks.</td>
<td>□ I have fun at school only once in a while.</td>
</tr>
<tr>
<td>□ I look ugly.</td>
<td>□ I have fun at school many times.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 15</th>
<th>Item 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ I have to push myself all the time to do my schoolwork.</td>
<td>□ I have plenty of friends.</td>
</tr>
<tr>
<td>□ I have to push myself many times to do my schoolwork.</td>
<td>□ I have some friends but I wish I had more.</td>
</tr>
<tr>
<td>□ Doing schoolwork is not a big problem.</td>
<td>□ I do not have any friends.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 16</th>
<th>Item 23</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ I have trouble sleeping every night.</td>
<td>□ My schoolwork is alright.</td>
</tr>
<tr>
<td>□ I have trouble sleeping many nights.</td>
<td>□ My schoolwork is not as good as before.</td>
</tr>
<tr>
<td>□ I sleep pretty well.</td>
<td>□ I do very badly in subjects I used to be good in.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 24</th>
<th>Item 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ I can never be as good as other kids.</td>
<td>□ Nobody really loves me.</td>
</tr>
<tr>
<td>□ I can be as good as other kids if I want to.</td>
<td>□ I am not sure if anybody loves me.</td>
</tr>
<tr>
<td>□ I am just as good as other kids.</td>
<td>□ I am not sure that somebody loves me.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 26</th>
<th>Item 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ I usually do what I am told.</td>
<td>□ I get along with people.</td>
</tr>
<tr>
<td>□ I do not do what I am told most times.</td>
<td>□ I get into fights many times.</td>
</tr>
<tr>
<td>□ I never do what I am told.</td>
<td>□ I get into fights all the time.</td>
</tr>
</tbody>
</table>
APPENDIX R

CENTER OF EPIDEMIOLOGICAL STUDIES – DEPRESSION SCALE (CES-D)
Circle the number for each statement which best describes how often you felt or behaved this way – *DURING THE PAST WEEK*

<table>
<thead>
<tr>
<th><strong>DURING THE PAST WEEK</strong></th>
<th>Rarely or None of the Time (&lt;1 Day)</th>
<th>Some or a Little of the Time (1-2 Days)</th>
<th>Occasionally or a Moderate Amount of the Time (3-4 Days)</th>
<th>Most or All of the Time (5-7 Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was bothered by things that usually don’t bother me</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. I did not feel like eating; my appetite was poor</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. I felt that I could not shake off the blues even with help from my friends or family</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. I felt that I was just as good as other people.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. I had trouble keeping my mind on what I was doing</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. I felt depressed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. I felt that everything I did was an effort</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. I felt hopeful about the future</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. I thought my life had been a failure</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I felt fearful</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. My sleep was restless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. I was happy</td>
<td>0</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. I talked less than usual</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. I felt lonely</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. People were unfriendly</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. I enjoyed life</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17. I had crying spells</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. I felt sad</td>
<td>0</td>
<td>1</td>
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<td>3</td>
</tr>
<tr>
<td>19. I felt that people disliked me</td>
<td>0</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20. I could not get “going”</td>
<td>0</td>
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<td>2</td>
<td>3</td>
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</table>