

# Understanding recovery in children following traffic-related injuries: Exploring acute traumatic stress reactions, child coping, and coping assistance

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## Abstract

Millions of children incur potentially traumatic physical injuries every year. Most children recover well from their injury but many go on to develop persistent traumatic stress reactions. This study aimed to describe children's coping and coping assistance (i.e., the ways in which parents and peers help children cope) strategies and to explore the association between coping and acute stress reactions following an injury. Children ( $N = 243$ ) rated their acute traumatic stress reactions within one month of injury and reported on coping and coping assistance six months later. Parents completed a measure of coping assistance at the six-month assessment. Children used an average of five to six coping strategies (out of 10), with wishful thinking, social support, and distraction endorsed most frequently. Child coping was associated with parent and peer coping assistance strategies. Significant acute stress reactions were related to subsequent child use of coping strategies (distraction, social withdrawal, problem-solving, blaming others) and to child report of parent use of distraction (as a coping assistance strategy). Findings suggest that children's acute stress reactions may influence their selection of coping and coping assistance strategies. To best inform interventions, research is needed to examine change in coping behaviors and coping assistance over time, including potential bidirectional relationships between trauma reactions and coping.

## Keywords

Child, coping, coping assistance, injury, traumatic stress

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## **Physical injury and traumatic stress**

Physical injury is an unfortunately common and potentially traumatic event for children. According to the World Health Organization (2008), once children reach the age of five years, injury is the greatest threat to their survival and a major cause of long-term disability. While the physical symptoms of pediatric injury typically improve over time, a significant number of children who incur injuries experience persistent negative psychological reactions (Cox, Kenardy, & Hendrikz, 2008; Kassam-Adams & Fein, 2003; Kassam-Adams et al., 2011; Kenardy, Spence, & Macleod, 2006; Landolt, Vollrath, Gnehm, & Sennhauser, 2009; Winston, Baxt, Kassam-Adams, Elliott, & Kallan, 2005). Traumatic stress reactions are a concern for youth injured in motor vehicle crashes (MVCs; (Kassam-Adams, Fleisher, & Winston, 2009; Keppel-Benson, Ollendick, & Benson, 2002; Landolt et al., 2009; Stallard, Salter, & Velleman, 2004; Winston et al., 2005). Traumatic stress reactions include symptoms of re-experiencing, avoidance, hyperarousal, and impaired daily functioning (American Psychiatric Association, 1994, 2010; Stallard, Velleman, & Baldwin, 2001a; Winston et al., 2002). For children involved in MVCs, traumatic stress reactions that occur within the first month after injury (i.e., acute stress reactions) predict later posttraumatic stress symptoms (PTSS) (Kassam-Adams & Winston, 2004), underscoring the importance of understanding the mechanism by which early reactions can lead to persistent symptoms.

### *Coping with injury and traumatic stress*

Lazarus (1996) defined coping as behaviors utilized to control or change a situation and to manage emotional reactions to a perceived stressor. According to Folkman and Lazarus's theory (Folkman & Lazarus, 1985; Lazarus, 1991; Lazarus & Folkman, 1984) and applied to PTSS by Ehlers and Clark (2000), the way in which children appraise and experience stressful events influences their selection of coping techniques. For pediatric injury, empirical data suggest a relationship between child coping and both concurrent and subsequent PTSS (Stallard & Smith, 2007; Zehnder, Prchal, Vollrath, & Landolt, 2006). While the impact of coping on PTSS has been identified, factors that may influence the selection of coping strategies following pediatric injury (i.e., acute stress reactions) have not yet been investigated.

### *Parent and peer coping assistance following pediatric injury*

Child PTSS have been associated with social support in children who have sustained injuries as a result of MVCs (Keppel-Benson et al., 2002; Stallard, Velleman, Langsford, & Baldwin, 2001b); however, the relationship between child acute stress reactions and specific types of social support (e.g., parent and peer coping assistance) has yet to be investigated. Parents play an important role in teaching children to cope with non-traumatic stressors (Peterson, Oliver, & Saldana, 1997). Specifically, Miller and colleagues' model of parent socialization of child coping posits that parents influence child coping strategies via coaching and modeling (Miller, Kliewer, Hepworth, & Sandler, 1994). Furthermore, some research suggests that after pediatric injury, parents employ numerous coping assistance strategies to facilitate their child's adjustment (Marsac, Mirman, Kohser, & Kassam-Adams, 2011). Although little is known about the role of peers in helping children recover after MVC-related injuries, peers generally provide an important source of social and cognitive support for children (Hartup, 1996). In addition, peers are among the leading providers of coping assistance for children following natural disasters and may positively impact children's psychological well-being in the aftermath of these events (La Greca, Silverman, Vernberg, &

Prinstein, 1996; Prinstein, La Greca, Vernberg, & Silverman, 1996). While research suggests that young adults (ages 17–22 years) who have sustained injuries are less likely to develop posttraumatic stress disorder (PTSD) symptoms when they perceive high levels of support from friends (Haden, Scarpa, Jones, & Ollendick, 2007), no studies have examined parent or peer coping assistance as related to acute trauma reactions in the aftermath of pediatric injury.

### *Current study*

To inform future interventions that promote healthy recovery for children following MVCs, this study aimed to: (1) describe child coping and parent and peer coping assistance (i.e., the ways in which parents and peers help children cope) in the six months after injury; and (2) explore how acute stress reactions relate to subsequent coping and coping assistance. The following specific research questions were addressed:

- 1) What types of coping strategies do children use in the six months following MVC-related injuries?
- 2) How are parent and peer coping assistance related to child coping after MVC-related injuries?
- 3) Are acute stress reactions following a MVC-related injury associated with later child coping and parent or peer coping assistance?

## **Method**

### *Sample*

Participants included 243 children (ages 8–17 years;  $M = 11.3$ ,  $SD = 2.5$ ) and one parent per child. The large majority of children (75%) were male. Racial information obtained from hospital records revealed that the sample was predominantly Black (56%), while 39% of the sample was White. As a requirement for participation, all children sustained injuries requiring medical treatment. Approximately 50% of children were injured by a motor vehicle while riding a bike, 33% of children were injured by a motor vehicle while pedestrians, and 16% of children were injured as motor vehicle occupants involved in a MVC. Nearly 40% of children suffered at least one extremity fracture. On average, children in this sample had an Injury Severity Score of 7.87 (range = 1–30,  $SD = 6.2$ ). The average length of stay in the hospital was approximately 3.25 days (range = 1–35,  $SD = 4.0$ ), and 26% were admitted to the intensive care unit. Most participating parents (88 %) were mothers or other female guardians. Six-month follow-up assessments (T2) were completed by 171 children (70% of participants who enrolled at T1). There were no significant differences with regard to sex, age, or ethnicity for those retained to follow-up (T2) versus those completing T1 (within one month post-injury) only.

### *Procedures*

This study was approved by the hospital's Institutional Review Board. This was a longitudinal design with convenience sampling. Child–parent dyads were recruited from a large, urban Level I pediatric trauma center in the northeastern region of the United States. Eligibility criteria included incurring a physical injury within the past four weeks, receiving medical care in the hospital, being

between 8 and 17 years old, and having the ability to understand English well enough to complete questionnaires. Children were excluded from participating in the study if their injuries were the result of family violence, their current medical status or cognitive functioning precluded the completion of assessment instruments, or no parent was available to participate in and consent for the study. Eligible participants were identified by research staff while the child was in the hospital for medical treatment. Families were then approached, consented, and assessed at the family's earliest convenience. This occurred both in the hospital and at children's homes.

As part of a larger examination of posttraumatic stress in injured children and their parents (Kassam-Adams & Winston, 2004), measures of acute traumatic stress reactions, coping, and coping assistance were administered. Families were assessed at two time-points: within one month post-injury (T1) and approximately six months post-injury (T2). T1 assessments occurred in the hospital or at the child's home. At T1, children completed the Child Acute Stress Questionnaire (CASQ) to assess acute stress reactions. T2 assessments took place at the child's home. At T2, children completed the KidCope to report on their own coping as well as The Children's Coping Assistance Checklist (CCAC) to report on the coping assistance provided by their parents and peers. At T2, parents completed a parent-report version of the CCAC to report the coping assistance that they provided to their child in the six months following their child's injury.

## Measures

*Child acute stress reactions.* Child acute stress reactions were assessed with the CASQ (Winston et al., 2002), a 48-item self-report measure that was administered within one month post-injury (T1). The CASQ has demonstrated excellent internal consistency, test-retest reliability, and factor analytic support for construct validity (Winston et al., 2002). The CASQ yields a continuous Acute Stress Disorder (ASD) symptom severity score and presence/absence of each symptom. In the current analyses, we report on children who had clinically significant acute traumatic stress, defined as meeting Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) symptom criteria for ASD without regard for the dissociation requirement. Diagnostic criteria for ASD require children to have at least one symptom of re-experiencing, increased arousal, and avoidance of trauma-related stimuli (American Psychiatric Association, 1994, 2010).

*Child coping.* The KidCope (Spirito, Stark, & Williams, 1988) was used to assess child-endorsed coping strategies at six months post-injury (T2). The KidCope is a 15-item self-report measure that identifies 10 specific cognitive and behavioral coping strategies, including distraction, social withdrawal, problem-solving, emotion regulation, wishful thinking, cognitive restricting, self-criticism, blaming, social support, and resignation. The KidCope has acceptable psychometric properties, with moderate test-retest reliability over short periods of time (Blount et al., 2008; Spirito et al., 1988). It has also demonstrated convergent and construct validity through moderate-to-high correlations with other commonly employed coping measures (Blount et al., 2008; Spirito et al., 1988). Given the plethora of research with the KidCope and the psychometric properties of the measure, the KidCope is categorized as "approaching a well-established measure" by Blount and colleagues (2008).

*Parent and peer coping assistance.* The CCAC (Prinstein et al., 1996) was utilized to examine children's perceptions of the coping assistance provided by their parents and peers at six months post-injury (T2). This nine-item measure specifies three types of coping assistance: emotional

**Table 1.** Number and percent of children reporting the use of specific coping strategies (KidCope) over the six months post-injury, for those with and without significant acute stress reactions (Child Acute Stress Questionnaire (CASQ)).

Child coping: (child report:T2)	All children (T2; N = 164–171)	Children without significant acute stress reactions (T1; N = 164–171)	Children with significant acute stress reactions (T1; N = 164–171)	Significant $\chi^2$
Distraction	115 (67%)	83 (62%)	32 (88.9%)	$\chi^2 (1, N = 171)$ = 9.69, $p < .01$
Social withdrawal	76 (45%)	53(39%)	23 (65.7%)	$\chi^2 (1, N = 170)$ = 7.87, $p < .01$
Problem-solving	84 (50%)	60 (45%)	24 (69%)	$\chi^2 (1, N = 168)$ = 6.10, $p < .05$
Emotion regulation	110 (66%)	83 (62%)	27 (77%)	
Wishful thinking	141 (86%)	110 (84%)	31 (94%)	
Cognitive restructuring	139 (83%)	111 (82%)	28 (85%)	
Self-criticism	39 (24%)	29 (22%)	10 (29%)	
Blaming others	45 (26%)	31 (23%)	14 (40%)	$\chi^2 (1, N = 171)$ = 4.25, $p < .05$
Social support	126 (75%)	98 (73%)	28 (80%)	
Resignation	64 (37%)	47 (35%)	17 (47%)	

processing, encouraging return to roles and routines, and distraction. Parents reported on the coping assistance they provided to their children using a parallel version of the CCAC.

**Analyses.** The proportion of children using each coping strategy or receiving each type of coping assistance were compared between groups based on child sex, race, age (8–12 years versus 13–17 years), and the presence/absence of significant acute stress reactions utilizing Chi square analyses. Relationships between continuous measures (e.g., number of coping strategies, acute stress reactions) were evaluated with Spearman's rho correlations. Given the number of comparisons conducted to achieve the objectives of the study, the results from these comparisons should be interpreted as exploratory in nature.

## Results

### *What types of coping strategies do children use in the six months post MVA-related injuries?*

On the KidCope, children reported using a mean of 5.5 ( $SD = 2.3$ ; range = 0–10) out of 10 possible coping strategies during the six months following injuries (see Table 1). Children most often reported utilizing wishful thinking and cognitive restructuring strategies. Coping strategies did not differ by gender or age. A higher proportion of Black children than White children reported using distraction, 76% versus 57%,  $\chi^2(1, N = 161) = 6.04, p < .05$ , emotional regulation, 75% versus 55%,  $\chi^2(1, N = 158) = 7.34, p < .01$ , and wishful thinking, 94% versus 79%,  $\chi^2(1, N = 154) = 7.37, p < .01$ .

### *How are parent and peer coping assistance related to child coping behavior?*

Almost universally, parents reported providing each type of coping assistance (>97%) on the CCAC. Children also reported frequent parent use of these coping assistance strategies: 90% reported that their parents encouraged returning to routines, 74% that their parents used distraction, and 66% that their parents offered emotional processing on the CCAC. There were no significant differences in the types of coping assistance provided by parents based on child sex or age. A higher proportion of Black children (60%) than White children (41%) reported that their parents offered emotional processing,  $\chi^2(1, N = 162) = 4.70, p < .05$ , and a higher proportion of Black children (58%) than White children (38%) indicated parental use of distraction,  $\chi^2(1, N = 162) = 4.86, p < .05$ .

Examination of associations between child coping and parent coping assistance revealed that children were more likely to use social support coping when they also reported that their parents helped them by encouraging a return to normal routines, 77% versus 42%,  $\chi^2(1, N = 166) = 7.47, p < .01$ , or by using distraction, 80% versus 56%,  $\chi^2(1, N = 168) = 9.02, p < .01$ . Children were more likely to use emotional regulation when parents helped with emotional processing, 72% versus 52%,  $\chi^2(1, N = 165) = 6.57, p < .05$  and more likely to use distraction when parents used distraction to help them cope, 76% versus 40%,  $\chi^2(1, N = 168) = 17.72, p < .001$ . There were no significant relationships between parent-reported coping assistance and child coping.

Children nearly universally reported that peers helped them cope by encouraging them to return to normal activities (97%). Many children reported that friends helped by providing distraction (79%) or emotional processing (60%). There were no significant differences in the types of coping assistance provided by their peers, based on child age, sex, or race. Children were more likely to use social support coping when peers encouraged them to return to normal routines, 77% versus 46%,  $\chi^2(1, N = 166) = 6.08, p < .05$ , or used distraction, 81% versus 48%,  $\chi^2(1, N = 166) = 13.96, p < .001$ . Children were more likely to use emotional regulation coping when peers helped with emotional processing, 71% versus 56%,  $\chi^2(X, N = 165) = 3.9, p < .05$ , and more likely to use distraction coping when peers used distraction to help them cope, 74% versus 39%,  $\chi^2(1, N = 168) = 14.07, p < .001$ .

### *How do acute stress reactions relate to subsequent coping and coping assistance?*

Based on their scores on the CASQ, we compared two groups of children – those with ( $N = 36$ ; 21%) and without ( $N = 135$ ; 79%) significant acute stress reactions in the first month post-injury – for their use of coping strategies over the six months post-injury (see Table 1; see the *Measures* section for an explanation of the classification of significant acute stress versus non-significant acute stress symptoms). Children with significant acute stress reactions were more likely to later report utilizing distraction, social withdrawal, problem-solving, and blaming others as coping strategies during the six months following an injury. Children's acute stress reaction severity was positively associated with the total number of coping strategies they later utilized,  $r = .39, p < .001$ .

Only one association was detected between child acute reactions and parent or peer coping assistance: more children with significant acute stress reactions (compared to those without significant acute stress reactions) reported that their parent used distraction to help them cope, 92% versus 72%,  $\chi^2(1, N = 172) = 6.03, p < .05$ .



## Discussion

Findings from this study indicate that potentially important relationships exist among children's acute stress reactions and subsequent child coping and parent and peer coping assistance following pediatric injury sustained in a MVC.

### *Coping with injury and traumatic stress*

Consistent with previous research on the amount and types of coping strategies injured children use (Marsac et al., 2011; Stallard et al., 2001b), children in this study reported an average of between five and six out of 10 possible coping strategies, with wishful thinking and cognitive restructuring endorsed most frequently. Children with significant acute stress reactions employed more coping strategies over the six months following their injury. Thus, children with early distress may either have more to cope with or may try a variety of strategies before selecting an effective strategy to help them manage their distress. This is consistent with previous findings suggesting that children with persistent PTSS following MVCs use more coping than children who have recovered successfully (Stallard et al., 2001b). Study findings also highlighted that children with significant acute stress reactions were more likely to utilize specific types of coping (e.g., distraction, social withdrawal, problem-solving, and blaming others) in the six months after their injury. Since these types of coping also relate to later PTSS (Stallard et al., 2001b; Vernberg, LaGreca, Silverman, & Prinstein, 1996), the addition of our study finding suggests a possible bidirectional relationship between type of coping and trauma reactions in children. However, it should also be noted that certain acute stress reactions and coping strategies overlap. For example, avoidance (which could include distraction and withdrawal) is considered both a trauma reaction and a coping strategy. Thus, the association between acute stress reactions and increased use of coping strategies as documented in this study and others may be partially explained by this overlap. Thus, future investigations should examine how to distinguish avoidance as a symptom from avoidance as a coping strategy.

### *Parent and peer coping assistance following pediatric injury*

Study results extend previous research on how parents and peers provide support to children who have experienced a traumatic event. Parents almost universally reported providing multiple coping assistance strategies (e.g., return to normal routines, distraction, and emotional processing) to their children, suggesting parents find it important to help their children cope post-injury. In addition, as the parent socialization literature suggests (Kliewer et al., 2006), findings (per child report) indicate that parents play an important role in helping their children cope with traumatic stressors and that coping assistance influences how children cope. However, current study findings did not identify a relationship between parent-reported coping assistance and child coping. It is unclear whether this relationship does not exist within the pediatric injury population or whether these relationships were not identified due to measurement limitations. The difference in the findings for parent and child reports of coping assistance points to the importance of obtaining both child and parent perception when assessing parent coping assistance behavior. Consistent with previous literature on natural disasters (Prinstein et al., 1996), findings from this study demonstrate the importance of peers in supporting children following traumatic events. More specifically, as perceived by children, the types of coping assistance provided by peers may influence the coping strategies that children select following an injury. Given the potential importance of parents and peers in children's coping, professionals may consider these sources of support when developing interventions.

### *Coping, coping assistance, and cultural considerations*

Study findings contribute to our current understanding of possible cultural differences in coping and how parents and peer groups provide support. Differences were found between Black and White children within this study, with Black children being more likely to utilize distraction, emotional regulation, and wishful thinking coping strategies, and more likely to report that their parents provided emotional processing and distraction coping assistance. These findings are consistent with prior research regarding Black children's coping strategies after a hurricane (Salloum & Lewis, 2010). In addition, Black mothers reportedly provide high levels of coping assistance. This may be related to research that has suggested that Black mothers whose children are hospitalized following violent injury experience high levels of distress (Phelps et al., 2006). Thus, one possible explanation for Phelps and colleagues' (2006) findings is that a relationship may exist between maternal distress and subsequent coping assistance strategies employed.

### *Clinical implications*

While more research is needed to understand the exact nature of the relationships among acute stress reactions, coping, and coping assistance, the results of this study have potentially useful clinical implications for health care providers who work with children and families in the aftermath of pediatric injury. Of importance, results suggest that clinicians should obtain information about emotional recovery from both children and parents, as their perceptions often differ. In addition, because of the relationship between peers and parent coping assistance and child coping behavior, clinicians might consider assessing and modifying (when clinically indicated) the type of assistance provided. A novel avenue for providers to consider is integrating important peers into child recovery. For example, when providing education to families about injury recovery, clinicians might include peers in the conversations (with patient and parent permission).

### *Limitations*

Because this study relied on a convenience sample of children experiencing injuries resulting from MVC, findings may not generalize to children who have experienced other traumatic events. In addition, several measurement limitations should be noted. Firstly, the utilization of a brief screening tool as a coping measure allows us to begin to understand coping strategies in this population but does not allow for an in-depth analysis of child coping (Blount et al., 2008; Spirito, 1996). Secondly, while limited variability in reports of parent and peer coping assistance may reflect overall high levels of support, the ceiling effect limits our ability to examine correlates of coping assistance. Thirdly, this study relied on child report of peer coping assistance rather than peer self-report and only assessed coping and coping assistance at six months post-injury. Finally, comparative results from this study should be interpreted as exploratory, given the number of comparisons that were conducted. Future studies should employ a more sensitive, comprehensive, and longitudinal assessment of the ways that parents and peers help children cope with trauma in order to tease apart more subtle differences within this process.

### *Future directions*

To inform preventive interventions, research should further clarify the potential bidirectional relationships among acute stress reactions, coping, and coping assistance. This can be accomplished



by conducting assessments at multiple time points in the post-injury recovery period. Future studies should consider collecting data from all reporters (child, parents, and peers) over time. By better understanding the trajectory of traumatic stress symptoms and the role of coping and coping assistance in this trajectory, we can improve our ability to prevent PTSS following pediatric injury.

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## **Author biographies**

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**Flaura K Winston, MD PhD** is a board-certified pediatrician, a doctorally-trained engineer and a public health researcher, who conducts research at the interface of child and adolescent health, injury, engineering and behavioral science. Dr. Winston's work is published in peer-reviewed journals and conference proceedings and focuses on traffic injury prevention and treatment, with a focus on secondary prevention of traumatic stress. Her research to action to impact approach, pragmatic rigor, has led to patents and a focus on evidence-based mobile health (mHealth) for better health.

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