Parental Response to Child Injury: Examination of Parental Posttraumatic Stress Symptom Trajectories Following Child Accidental Injury

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Objective Trajectory analyses were used to empirically differentiate patterns of posttraumatic stress symptoms in parents following child accidental injury and explore the relationship between parent and child recovery patterns.

Method Parent (n = 189) self-reported symptoms from acute to 2 years post accident were examined to (1) identify distinct parent symptom trajectories; (2) identify risk factors; and (3) explore the patterns of children and parents together.

Results Analysis revealed three distinct symptom trajectory groups for parents: resilient (78%); clinical level acute symptoms that declined to below clinical level by 6 months (recovery 8%); and chronic subclinical (14%). Children of resilient parents were most likely to be resilient. Half of the children of parents with chronic subclinical trajectories were likely to have chronic trajectories.

Conclusion Clinicians cannot rely only on clinical level symptoms in parents to identify high risk families but include families where the parent has subclinical level symptoms.

Key words parent; posttraumatic stress; symptom trajectory.

Introduction

Purpose of the Study

Parents have been found to be at risk of the development of posttraumatic stress disorder (PTSD) after traumatic injury to their child (De Vries et al., 1999; Hall et al., 2006; Sturms et al., 2005). A crucial part of a child’s recovery after traumatic injury depends on the parent’s ongoing support; however, parents’ own psychological distress may interfere with this or may act to exacerbate other risk factors (De Vries et al., 1999; Sturms et al., 2005). Parental anxiety has been associated with poorer child functioning post accidental injury (Taylor et al., 1999). To date, research on posttraumatic stress symptoms (PTSS) in parents and their children following illness or accidental injury has concentrated on identifying prevalence rates and risk factors. Some studies have explored symptoms over time; however, little is known about the course of PTSS in adults or children. Using a medical traumatic stress framework (Kassam-Adams, 2006), we identify trajectories of distress symptoms in parents following child accidental injury, explore predictors of trajectory group membership and examine the relationship between child and parent symptom trajectory groups. This framework is used to understand child and family responses to illness and injury including PTSS as well as coping, resilience, and growth.

PTSS in Parents Following Child Injury or Illness

A range of studies have explored the incidence of PTSS in parents following illness or injury to their child including pediatric head injury (Taylor et al., 1999), organ transplant (Young et al., 2003), cancer (Kazak et al., 2004; Phipps, Dunavant, Lensing, & Rai, 2005; Phipps, Larson, Long, & Rai, 2006), burn injury (Hall et al., 2006), diagnosis of diabetes (Landolt, Vollrath, Laimbacher, Gnehm, & Sennhauser, 2005), and accidental injury (De Vries et al., 1999; Sturms et al., 2005). These studies show that
parents are at risk of significant PTSS following their child’s illness or injury with rates as high as 50% depending on the population studied and methodology used (Kazak et al., 2004; Phipps et al., 2005; Sturms et al., 2005; Young et al., 2003).

Studies of parental stress reactions show that initial mean symptoms of distress decline (Balluffi et al., 2004; Phipps et al., 2005; Wijnberg-Williams, Kamps, Klip, & Hoekstra-Weebers, 2006). However, acute symptoms have also been found to be significantly related to ongoing distress (Hall et al., 2006). Layne et al. (2009) and Bonanno (2005) have proposed several models of PTSS over time; however, few studies have explored patterns parental trajectories. Dolgin et al. (2007) used a group-based trajectory analysis to identify three distinctive individual trajectories of mothers’ PTSS following their children’s diagnosis of cancer. About half of their sample were predicted to have low initial symptoms that remained stable over time, a second group had moderate symptoms throughout the 6 months of the study (43%), and a third group were predicted to have high initial symptoms that declined to moderate by 3 months post diagnosis (6%). Parent and child demographic, cultural, and psychosocial variables were examined; however, weak but significant predictors of PTSS trajectories were limited to maternal personality traits (extroversion, agreeableness and neuroticism) and problem solving ability (Dolgin et al., 2007).

Steele and his colleagues (2004) used hierarchical cluster analysis to identify groups of participants based on maternal distress scores. They found four distinct patterns of maternal stress in mothers of children with cancer in the 6 months following their child’s diagnosis: stable high (13%), stable moderate (25%), declining (31%) and low (27%) levels of symptoms. Risk factors were not examined; however, they did find that high levels of maternal distress were associated with maternal report of distress in their child.

Only two other studies have used advanced modeling to explore the trajectories of adult (not parent) PTSS over time (O’Donnell, Elliott, Lau, & Creamer, 2007; Orcutt, Erickson, & Wolfe, 2004). These studies found two distinct probable trajectories: the majority with stable low symptoms and a group with higher levels of initial symptoms that increased significantly over time (O’Donnell et al., 2007; Orcutt et al., 2004).

**Risk Factors**

A range of risk factors have been explored to determine their impact on PTSS in parents. The role of injury severity in predicting parental PTSS is still unclear. Physician rated functional status of the child (Landolt, Vollrath, Ribi, Gnehm, & Sennhauser, 2003), size of burn (Hall et al., 2006), severity of child’s illness (Sturms et al., 2005), and admission to intensive care compared to general wards (Balluffi et al., 2004) have been found to significantly predict parental PTSS. In contrast, objective assessment of injury severity and life threat have been found to be non-significant (Balluffi et al., 2004; Bruce, 2006; De Vries et al., 1999). Orcutt et al. (2004) found that combat exposure predicted the type of symptom trajectory suggesting that severity of the threat may be related to poorer outcomes over time.

Demographic characteristics have been observed to predict PTSS in adults; however, few have been found to predict symptoms in parents (Farley et al., 2007; Greening & Stoppelbein, 2007; Wijnberg-Williams et al., 2006). Some studies have observed increased vulnerability in mothers compared to fathers (Balluffi et al., 2004; Greening & Stoppelbein, 2007) while others have found no significant difference (Wijnberg-Williams et al., 2006). Other parent variables such as age (Hoekstra-Weebers, Jaspers, Kamps, & Klip, 1999), marital status (Farley et al., 2007), employment status, and socio-economic status (Landolt et al., 2003; Phipps, Larson, Long, & Rai, 2006) have been found to be non-significant; however, it is worth exploring their effect on symptom levels over time.

Parent’s previous mental health problems have been found to predict parent PTSS (Pelcovitz, 1998). In addition, parenting style and coping may mediate the relationship between parental and child symptoms (Deblinger, Steer, & Lippmann, 1999). Most studies have also found that child variables such as age and gender are not significantly related to parental PTSS (Barakat, Alderfer, & Kazak, 2006; Farley et al., 2007; Greening & Stoppelbein, 2007); however, one study found that younger child age increased the risk of parental PTSS (De Vries et al., 1999). Time since diagnosis, treatment or transplant have also not been found to predict parental PTSS (Barakat et al., 2006; Bruce, 2006; Farley et al., 2007; Greening & Stoppelbein, 2007; Kazak et al., 2004).

In summary, parents are at risk for developing significant PTSS following illness and injury in their child. Studies examining risk factors show inconsistent results. Symptoms may not be predicted by the severity of their child’s illness or injury; however, evidence suggests that there is a significant relationship between parent’s and child’s level of symptoms. Few studies have examined risk factors for adult symptom trajectories over time (Dolgin et al., 2007; O’Donnell et al., 2007; Orcutt et al., 2004; Phipps et al., 2005; Steele et al., 2004).
We hypothesized that average rates of parental PTSS would decline over time (H_1). We investigated parent self-reported stress symptoms to examine the number (one to seven) and shape (quadratic to linear) of symptom trajectories over time. We hypothesized that there would be more than one observed trajectory (H_2). We expected that the majority of parents would have low levels of PTSS throughout the study (H_3). In addition, we expected that a minority of parents would have high levels of PTSS that persisted (H_4). We hypothesized that the majority of parents who had high levels of initial distress would improve over time (H_5). This study focused on individual symptoms of parental stress over time using a generalized, semi-parametric mixture model. We hypothesized that child injury, parent and child characteristics would impact on the maintenance or improvement of levels of traumatic stress symptoms over time (H_6). The following variables were investigated: injury type, parent variables (age, marital status, employment, relationship to child and parenting behaviors), and child variables (gender, age, acute stress reaction to the event and premorbid functioning). We then explored the probability of joint trajectory group membership for both parents and their child and suggested that a strong relationship between parent and child symptoms over time would be observed (H_7).

Methods
Participants and Procedures

Data for this analysis came from a study focusing on child psychological response following accidental injury. A total of 401 children and their parents were eligible and invited to participate in the study; however, 85 families declined and an additional 111 families did not return initial questionnaires. The final sample consisted of 205 (participation rate 51%) parents of children aged 7–16 years admitted to general or intensive care pediatric units following accidental traumatic injury for a minimum overnight stay. One caregiver of each injured child was recruited to participate in the study. The participants were recruited through three tertiary hospitals in Brisbane, Australia, after appropriate ethical review board approval. Children with head injuries and those who sustained injuries following interpersonal violence were not included in the study.

Children and their parents were recruited within 72 hr of admission. Parent consent and child assent (10+ years) was obtained. Data was collected at four time points following the child’s accidental injury. At a weighted average of 6 days post admission (n = 180; range 3–14 days), parents were given questionnaires and asked to return them in a reply paid envelope. Interviews with the parent and child were conducted at 4–6 weeks (n = 172; range 28–42 days) and questionnaires were collected at this time. At 6 months (n = 160; range 144–172 days), families were contacted to arrange a telephone interview and questionnaires and reply paid envelopes were mailed to parents. A subsample also completed questionnaires 2 years post injury (n = 51). Questionnaires and reply paid envelopes were mailed to parents who agreed to participate.

Sample Characteristics

The majority of the children (64%) in the study were male and the mean age was 10.69 years (SD = 2.31). The majority of patients attending the study hospitals (92%) were born in Australia (Dallow, Lang, & Bellamy, 2007). The majority of accidents involved falls (39%), bike accidents (19%), sporting injuries (12%), and the child being hit by a car or motor vehicle accident (11%). The child’s mean length of hospital stay was 4.25 days (SD = 6.67). The majority of parents who completed the questionnaires were mothers (84%). The average age of parents was 38.79 years (SD = 5.53). Most informants were married (74%) and employed (69%). Although some parents witnessed their child’s accident (e.g., the child was injured while crossing the road to meet with parent) or were involved in the accident in some way (e.g., driver of the vehicle), only one parent had injuries requiring medical attention.

Measures

Total Subjective Distress

At each stage, parent acute and posttraumatic symptoms were measured using the Impact of Event Scale (IES) (Horowitz, Wilner, & Alvarez, 1979). The IES is a 15-item self-report measure designed to assess subjective distress subsequent to any specific life event. Respondents were asked to rate the items on a 4-point scale (Not at all = 0, Rarely = 1, Sometimes = 3, and Often = 5) according to how often the symptoms had occurred in the past 7 days. The IES consists of two subscales, Intrusion and Avoidance, which were summed to provide a latent measure of Total Subjective Distress. It has adequate internal consistency and good test–retest reliability (Sundin & Horowitz, 2002). In our study, internal consistency was high (Cronbach’s α > .90 for all time points). We used a cut-point of 27 for classification of persons likely to have PTSD (Coffey, Gudmundsdottir, Beck, Palyo, & Miller, 2006).

Independent Variables

Children experienced a range of injuries which were divided into two categories: fractures, dislocations, lacerations,
and other injuries (87%) and more complex/serious injuries including burns, internal and multiple injuries (13%). Preparatory data investigation showed that length of hospital stay was homogenous within the two injury categories but significantly different between them (Mann–Whitney U-test, \( Z = −5.76, p < .001 \)). Therefore, categorization of injury also represents variation relating to severity and subsequent overall hospital experience.

Parent demographic variables collected at Time 1 (age, relationship to the child, marital status and employment) were included in the analysis as risk factors. Parent mental health at the time of the injury was assessed using the General Health Questionnaire (GHQ-28), a 28-item self-report measure of current, non-psychotic mental health (Whaley, Morrison, Payne, Fritschi, & Wall, 2005). Each of the four subscales were composed of seven items with a Likert scale (Not at all true of me \( = 0 \), Very/often true \( = 5 \)). The total GHQ score was calculated by summing the subscale totals and then dichotomized (cut point 24) into chronic compared to no chronic mental health problems (Goldberg et al., 1997). The GHQ has high concordance with clinical interviews and psychiatrist’s ratings with adequate sensitivity and specificity (Goldberg et al., 1997). In our study, the subscale’s reliability, using Cronbach’s \( \alpha \), ranged from .74 to .93.

Parenting behavior at the time of the injury were assessed using the Parent Support–Control Questionnaire (PSCQ) (Lilley, 2003). The PSCQ, a 26-item parent self-report questionnaire, assesses parental support (warmth, acceptance, involvement, child centeredness, etc.) and parent control (involving pressure and child behavioral compliance). Each subscale has 13 items which are scored on a Likert scale (Not at all true of me \( = 1 \), Extremely true of me \( = 6 \)). Higher scores indicate greater parental warmth or greater parental control. The scale has moderate convergent validity (Support \( r = .60 \); Control \( r = .75 \)) and good internal consistency (Cronbach’s \( \alpha \): Support = .86; Control = .83) (Lilley, 2003). In our study, Cronbach’s \( \alpha \) was .74 for Support and .77 for Control.

Child risk variables (age, gender, and pre-injury behavior problems) were also explored. Pre-trauma behavior was assessed using the Child Behavior Checklist (CBCL) (Achenbach & Rescorla, 2001). In the acute period, parents were asked to complete the checklist in relation to their child’s behavior prior to the accident. The CBCL consists of 20 social competence and 113 behavioral problem items rated by the parent on a three-point scale (Not true of me \( = 0 \), Very/often true \( = 2 \)). The items were used to generate broad-band scales of internalizing and externalizing behavior problems (Cronbach’s \( \alpha \): Internalizing: .87; Externalizing: .90). In order to assess clinical significance, the scales were converted to T-scores which have been found to have excellent reliability and validity (Achenbach & Rescorla, 2001). Extensive studies have been conducted to establish the external validity, cross-cultural validity (including Australian norms), and reliability of the CBCL (Achenbach & Rescorla, 2001).

Child acute and PTSS were measured using the Child Impact of Event Scale (CIES) (Dyregrov, Kuterovac, & Barath, 1996). The CIES is an 8-item child self-report measure assessing symptoms of intrusion and avoidance in the last 7 days on a 4-point scale (Not at all \( = 0 \), Rarely = 1, Sometimes = 3, and Often = 5). Items were summed to create a latent measure of Child Total Subjective Distress.

Statistical Methods and Analyses

We used a generalized, semi-parametric, mixture model to identify probable distinctive clusters of trajectories describing the course of PTSS in parents over 6 months following their child’s accidental injury (Nagin, 1999). Maximum likelihood was used to model the number (H2), shape (polynomial parameters) and probability of trajectory group membership based on IES scores (H2-H3). The iterative procedure fine tunes group membership and the parameters of the trajectories until a criterion of little further change in likelihood is achieved. Different possible models of one to seven groups were compared using the criterion of reasonableness of group size as well as the difference in likelihood expressed as twice the Bayesian Information Criterion (BIC) value (Jones, Nagin, & Roeder, 2001). To avoid correlation of polynomial coefficients, time of measurement was recoded to center at zero. The censored normal distribution for Total Subjective Distress was assumed.

Potential injury, child and parent risk factors assessed at Time 1 (current and pre-injury status) which could affect the probability of trajectory group membership were analyzed using univariate and multivariate models (H2). A simultaneous analysis of the parent and child Total Subjective Distress trajectories was then used to explore probabilities of joint group membership. The polynomial parameters and group estimates from the child (Le Brocque, Hendrikz, & Kenardy, 2010) and parent trajectory analyses were used as starting values for the iterative dual procedure. SAS version 9.1 and the SAS-based
procedure PROC TRAJ (Jones et al., 2001) was used. Data is presented showing analysis up to 6 months. For univariate tests, alpha levels of .10 were used to maximize the number of potential variables in the multivariate analysis. For the multivariate model, alpha levels were .05. Confirmatory analyses were conducted to explore patterns up to 2 years.

**Attrition and Missing Data**

A total of 189 families had self-report data. Complete parent Total Subjective Distress scores at all three time points was obtained for 148 (78%) of parents. Parents of boys had a significantly higher rate of complete data (84%) than parents of girls (67%) \( \chi^2(1, N=190) = 7.44, p < .01 \). Trajectory modeling does not require individuals to have complete outcome records across time however the gender differences in attrition are addressed in the discussion. No other significant differences were observed for all other relevant factors and outcomes between those with and without complete data at six months.

**Results**

**PTSS over Time**

As expected, the mean scores of parent total subjective distress declined over time post child injury (Figure 1). In addition, the percent of parents who had clinical level scores of 27 and above declined from 16% in the acute phase to 3% by 6 months. Trajectory analyses of parental traumatic stress symptoms up to 6 months following child accidental injury identified three optimum trajectories (Table I, Figure 1). These were either (1) well below clinical level values for the entire period (resilient: 78%), (2) a linear decline from above clinical levels in the first 3 months to below the clinical cutoff (recovery: 8%) or (3) a constant, elevated but subclinical level throughout the post injury period (chronic subclinical: 14%). Although we hypothesized that we would find a trajectory with parents who had persistent high level symptoms, this group was not observed. Analysis of data up to 2 years confirmed that the patterns of recovery were stable apart from a slight change in the polynomial form.

**Risk Factors for the Probability of Parent Trajectory Group Membership**

As predicted, a range of parent and child factors were significant \( p < .10 \) in terms of parent’s probability of group membership: child’s injury, parent mental health and parenting control, child acute stress and premorbid internalizing and externalizing scores (Table II). Parent factors which were non-significant included: age, marital status, relationship to the child, employment status, and parenting support (PSCQ Support). Child age and gender were also not significant predictors of parent trajectory patterns. Child’s injury had a significant impact on parent’s predicted group membership with a parent more likely to be in the recovery or chronic subclinical trajectory group when their child had a severe or complicated injury such as burns or multiple injuries. Similarly, a parent with chronic mental health symptoms (GHQ score ≥24) was significantly more likely to have a recovery or chronic subclinical PTSS trajectory than parents with low mental health symptoms. The probability of a parent being in the recovery group also increased significantly with increasing scores on parental control. With regards to the child factors, parents of children with higher acute stress or premorbid internalizing behaviors had a significantly elevated probability of membership in the chronic subclinical group. If a child had higher premorbid externalizing behaviors the parent was also more likely have a chronic sub-clinical trajectory than a resilient trajectory.

A multiple risk factor analysis resulted in significant partial effects of parent mental health \( p < .01 \) and child premorbid behavior problems \( p < .05 \) on the probability of group membership in both the recovery and chronic subclinical groups (see Table II). Child premorbid internalizing and externalizing scores were correlated (Pearson’s \( r = .59, p < .001 \)) therefore only the internalizing score was included. Whilst the effect of more serious injury on the probability of membership in the chronic subclinical group became non-significant, it remained significant for
the recovery group ($p < .01$). Parent control became non-significant.

**Dual Trajectory Analysis for Parents and Children**

In a previous paper (Le Brocque, Hendrikz, & Kenardy, 2010) the trajectories of children's psychological response to accidental injury were explored. Analysis of child distress symptoms resulted in three distinct trajectories: resilient (57%), recovery (33%), and chronic symptoms (10%). The joint probability of group membership for parents and children from a dual trajectory analysis is shown in Table III and Figure 2. It was estimated that 74% of parents with trajectories of low levels of PTSS had children who recovered by 6 months even if they exhibited PTSS in the first 4-6 weeks (parent resilient and child resilient probability = .51; parent resilient and child recovery probability = .23). An estimated 9% of families were predicted to have chronic symptom trajectories for both the parent (subclinical) and the child (clinical). Therefore it is evident that there is a strong relationship between parent and their child trajectory patterns.

**Discussion**

This study explored parental PTSS trajectories following child accidental injury and admission to hospital. Parents have been found to be at risk for significant PTSS following their child’s admission to hospital especially in the acute phase (Balluffi et al., 2004; Hall et al., 2006; Kazak et al., 2004). Previous evidence suggests that there is a gradual

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**Table I. Parent Trajectory Symptom Profiles**

<table>
<thead>
<tr>
<th>Estimated group size $N$ (%)</th>
<th>Symptom trajectory</th>
<th>Trajectory polynomials</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>148 (78%)</td>
<td>Resilient</td>
<td>Quadratic</td>
<td>Below clinical for entire period</td>
</tr>
<tr>
<td>15 (8%)</td>
<td>Recovery</td>
<td>Linear</td>
<td>Above clinical up to 3 months—below by 6 months</td>
</tr>
<tr>
<td>26 (14%)</td>
<td>Chronic subclinical</td>
<td>Constant</td>
<td>Above 18 but below 27 entire period</td>
</tr>
</tbody>
</table>

**Table II. Significant One-Way and Multiple Partial Effects of Injury, Parent and Child Risk Factors on Parent Trajectory Group Membership (Reference: Resilient Parent Trajectory Group)**

<table>
<thead>
<tr>
<th>Parent trajectory group compared to resilient group</th>
<th>$N$</th>
<th>Individual odds ratio (CI)</th>
<th>Multiple partial odds ratio ($N = 165$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s Injury: Complex/Burns compared to Fracture/Dislocation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recovery</td>
<td>188</td>
<td>12.17 (3.24–45.67)**</td>
<td>293.48 (5.86–14699.77)**</td>
</tr>
<tr>
<td>Chronic subclinical</td>
<td>4.69 (1.17–18.73)*</td>
<td>12.38 (0.63–243.99)</td>
<td></td>
</tr>
<tr>
<td>Parent Mental Health GHQ score ≥24 compared to &lt;24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recovery</td>
<td>181</td>
<td>20.57 (3.80–111.28)**</td>
<td>697.60 (9.14–53261.23)**</td>
</tr>
<tr>
<td>Chronic subclinical</td>
<td>10.32 (2.82–37.81)**</td>
<td>89.88 (4.37–1849.88)**</td>
<td></td>
</tr>
<tr>
<td>Parental Control (PSCQ)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Recovery</td>
<td>181</td>
<td>1.05 (1.00–1.11)$^p$</td>
<td>1.08 (0.97–1.20)</td>
</tr>
<tr>
<td>Chronic subclinical</td>
<td>0.99 (0.94–1.04)</td>
<td>1.06 (0.97–1.15)</td>
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</tr>
<tr>
<td>Child acute stress CIES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recovery</td>
<td>175</td>
<td>1.05 (0.98–1.11)</td>
<td>1.03 (0.93–1.14)</td>
</tr>
<tr>
<td>Chronic subclinical</td>
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<td>1.05 (0.99–0.11)</td>
<td>1.14 (1.00–1.30)$^*$</td>
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<tr>
<td>Chronic subclinical</td>
<td>1.07 (1.01–1.13)$^*$</td>
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<tr>
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<td>179</td>
<td>1.03 (0.97–1.09)</td>
<td>Not included</td>
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<tr>
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Note. 95% confidence intervals. Upper confidence limits are high where group sizes are small. GHQ = General Health Questionnaire; PSCQ = Parenting Support and Control Questionnaire; CIES = Child Impact of Events Scale; CBCL = Child Behavior Checklist.

$^*$A quadratic effect was added to the model but it was non-significant.

$p < .10$; $^*p < .05$; $^{**}p < .01$. 

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**Table III. Joint Probability of Group Membership for Parents and Children**

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<th>Estimated group membership for parents and children</th>
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**Figure 2. Dual Trajectory Analysis for Parents and Children**

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**Table IV. Significant One-Way and Multiple Partial Effects of Injury, Parent and Child Risk Factors on Parent Trajectory Group Membership (Reference: Resilient Parent Trajectory Group)**

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<td>Recovery</td>
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<td>1.05 (0.99–0.11)</td>
<td>1.14 (1.00–1.30)$^*$</td>
</tr>
<tr>
<td>Chronic subclinical</td>
<td>1.07 (1.01–1.13)$^*$</td>
<td>1.14 (1.02–1.27)$^*$</td>
<td></td>
</tr>
<tr>
<td>Child’s Premorbid CBCL externalizing$^*$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recovery</td>
<td>179</td>
<td>1.03 (0.97–1.09)</td>
<td>Not included</td>
</tr>
<tr>
<td>Chronic subclinical</td>
<td>1.05 (0.99–0.11)$^*$</td>
<td>Not included</td>
<td></td>
</tr>
</tbody>
</table>
decline in the mean level of stress symptoms over time (Ballufi et al., 2004; Dolgin et al., 2007; Phipps et al., 2005; Wijnberg-Williams et al., 2006) as was also observed in this sample.

Examination of the course of PTSS over time found multiple patterns of stress and coping following accidental injury. As hypothesized, our results showed that most parents cope well following their child’s illness or injury, with parents reporting consistently low levels of distress (Dolgin et al., 2007; Phipps et al., 2005; Phipps et al., 2006; Steele et al., 2004). Some parents had difficulty in the acute stage but these initial symptoms of distress tended to decline. Gradual improvement in levels of distress was also observed in a study of parents following diagnosis of cancer in their child (Dolgin et al., 2007). Some parents had difficulty in the acute stage but these initial symptoms of distress tended to decline. Gradual improvement in levels of distress was also observed in a study of parents following diagnosis of cancer in their child (Dolgin et al., 2007).

This study tested the partial effects of both parent and child risk variables on parental symptom trajectories using advanced modeling. Child injury, parental mental health, and child premorbid behavior problems were found in combination to significantly predict trajectory group membership. In addition, we simultaneously explored parent and child symptom trajectories using a dual, semiparametric mixture model. The analysis showed that most parents were predicted to have a trajectory of few symptoms and their children would also have a trajectory with few symptoms or be recovered by 6 months (74%). We identified a group of parents expected to exhibit chronic subclinical symptoms with children also exhibiting chronic stress symptoms (9%). More importantly this enables us to identify children with clinical level symptoms if the parent reports significant persistent, although subclinical, stress. Assessment of parental symptom trajectories may be an important diagnostic tool to identify children who are at risk especially when ongoing illness or injury factors may prevent assessment of child distress. These results reflect those found in other studies showing that parental distress is related to their reports of child distress, functioning and behavior (Phipps et al., 2006). The variability of symptoms of distress observed in parents suggests that the PTSS model is an appropriate model to explore parental reactions. Low rates of frank psychopathology suggest that a broad conceptualization of parental stress, coping and adjustment be utilized (Phipps et al., 2005). In addition, subclinical but persistent PTSS trajectories may have significant deleterious effects on parents and their children.
These results present interesting clinical and research challenges. Much research attention has focused on the identification of early risk factors for both adults and children in order to design and implement effective prevention and intervention (Bryant, 2005). Results from these studies have been mixed. Some studies have shown that symptom severity in the acute phase is a significant predictor of the development of chronic or later PTSD (Meiser-Stedman, Yule, Smith, Glucksman, & Dalgleish, 2005). Others have found that acute stress symptoms do not predict later diagnosis of PTSD (Creamer, O’Donnell, & Pattison, 2004). Our results identified a parental symptom trajectory with high levels of symptoms in the acute phase which declined relatively quickly to below clinical levels. About one third of their children had predicted chronic, clinical level symptoms. However, half of the children whose parent had chronic subclinical level trajectories were predicted to have chronic, clinical trajectories following admission to hospital. This suggests that clinicians should not rely only on clinical levels of symptoms in parents to identify high risk families when designing early interventions but also include families where the parent has subclinical level symptoms.

The use of trajectory analysis to explore patterns of symptoms of psychopathology in children and adults is in its infancy. There needs to be further research to confirm these patterns and to explore early risk indicators for the development of psychopathology and/or poor recovery patterns. Self report data, as used in this study, does however have limitations in terms of symptom reliability and validity especially when compared to standardized diagnostic criteria. Although the IES used to assess parent and child symptoms has adequate reliability and validity it is limited by a lack of clear criteria and norms for diagnosis. Further research exploring symptom trajectories using clinician obtained data is also recommended. Parental mental health and family functioning prior to their child’s accident may also influence symptom trajectories however these data were not assessed. The participation rate in this study was 51% and we cannot rule out that non-participants may in fact be those with the most severe persisting symptoms as described by Orcutt et al. (2004) and O’Donnell et al. (2007). Finally, although attrition was significantly lower in parents of males, gender was not found to be significant in predicting parental trajectory patterns.

To our knowledge, this is the first study of its kind to explore individual parent PTSS trajectories and underlying groups following child admission to hospital after accidental injury. Results from this study are easy to assimilate into our current clinical understanding of the course of PTSS over time. We know that, for most people, symptoms of stress are relatively low or decline over time after trauma. For some, however, symptoms remain significant and impact on many areas of functioning. Although this study clearly shows the interplay between the parent’s and child’s symptoms following the child’s hospitalization, we do not yet have a clear understanding of the direction of this relationship. What we do know, suggests that parent chronic subclinical problems may indicate functioning difficulties and stress in their child and that these patterns are associated with pre-injury child internalizing behavior problems and injury severity. The results from our data should be used to help us identify the pathways and symptom trajectories for at-risk individuals as well as provide a firm empirical basis for case conceptualization and for developing and prioritizing treatment options. Ongoing research is needed to explore the complexities of the parent-child dynamics of PTSS following child hospital admission, and to explore the mechanisms and processes through which risk and vulnerability are transmitted over time. This research brings us one step closer to understanding these complexities.

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**References**


and their parents. Clinical Psychology Review, 26, 233–256.


Le Brocque, R. M., Hendrikz, J., & Kenardy, J. A. (2010). The course of post traumatic stress disorder...


