<ORH><P>*Journal of Traumatic Stress*</P>

<P>June 2017, 30, 000–000</P></ORH>

<RRH>Predictors of Acute Stress Responses in Parents</RRH>

<LRH>Muscara et al.</LRH>

<ATL>Psychosocial, Demographic, and Illness-Related Factors Associated With Acute Traumatic Stress Responses in Parents of Children With a Serious Illness or Injury</ATL>

<AU><FNM>Frank</FNM> <SNM>Muscara</SNM>,^{1,2,3} <FNM>Maria C.</FNM> <SNM>McCarthy</SNM>,^{1,2,4} <FNM>Emma J.</FNM> <SNM>Thompson</SNM>,¹ <FNM>Claire-Marie</FNM> <SNM>Heaney</SNM>,¹ <FNM>Stephen J. C.</FNM> <SNM>Hearps</SNM>,¹ <FNM>Meredith</FNM> <SNM>Rayner</SNM>,^{1,5} <FNM>Kylie</FNM> <SNM>Burke</SNM>,^{5,6} <FNM>Jan M.</FNM> <SNM>Nicholson</SNM>,⁷ and <FNM>Vicki A.</FNM> <SNM>Anderson</SNM>^{1,2,3}</AU>

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1002/jts.22193](#).

This article is protected by copyright. All rights reserved.

<AFF>¹Clinical Sciences, Murdoch Children's Research Institute, Melbourne, Australia</AFF>

<AFF>²Department of Pediatrics, University of Melbourne, Melbourne, Australia</AFF>

<AFF>³Psychology Service, Royal Children's Hospital, Melbourne, Australia</AFF>

<AFF>⁴Children's Cancer Centre, Royal Children's Hospital, Melbourne, Australia</AFF>

<AFF>⁵The Parenting Research Centre, East Melbourne, Australia</AFF>

<AFF>⁶Parenting and Family Support Centre, School of Psychology, The University of Queensland, Brisbane, Australia</AFF>

<AFF>⁷Judith Lumley Centre, La Trobe University, Melbourne, Australia</AFF>

<P>The research project reported on here was conducted by the authors as part of their employment with the Murdoch Children's Research Institute, The Royal Children's Hospital, Melbourne, Australia, the Parenting Research Centre, or La Trobe University. We acknowledge the funding support for this project from the Pratt Foundation and the Victorian Government's Operational Infrastructure Support Program. No funder had any involvement in the planning, design, or execution of this research, or played a role in drafting the manuscript. We acknowledge the generosity of the participating families along with the contributions to the research made by Simone Hearps, Anica Dimovski, Nathan Dowling, and Amy Coe. Frank Muscara and Maria C. McCarthy are co-first authors. All authors had full access to the data, and take full responsibility for the integrity of the data and the accuracy of the data analysis.</P>

<P>Correspondence concerning this article should be addressed to Frank Muscara, Child Neuropsychology, Murdoch Children's Research Institute, The Royal Children's Hospital, Flemington Road, Parkville, Victoria, Australia, 3052. E-mail: frank.muscara@mcri.edu.au</P>

© 2017 International Society for Traumatic Stress Studies. Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/jts.22193

<ABS>This study investigated factors associated with acute stress symptoms in parents of seriously ill children across a range of illnesses and treatment settings within a pediatric hospital setting. It was hypothesized that psychosocial variables would be more strongly associated with acute stress responses than demographic and child illness variables. Participants were 115 mothers and 56 fathers of children treated within the oncology, cardiology, and intensive care departments of a pediatric hospital. Acute stress, psychosocial, demographic, and medical data were collected within the first 4 weeks of the child's hospital admission. A robust hierarchical regression model revealed that psychosocial factors significantly explained 36.8% of the variance in parent acute stress responses ($p < .001$); demographic variables significantly added a further 4.5% ($p = .022$), but illness-related factors did not contribute to the model. Findings support the implementation of a general psychosocial screening approach for parents across the wider hospital system, and that psychosocial risk factors may be targeted in interventions across different illnesses and treatment settings to improve parent outcomes.</ABS>

<P>Similar to other traumatic events, a life-threatening injury or illness in a child might elicit significant acute stress reactions in his or her parents (Bakker, Van Loey, Van der Heijden, & Van Son, 2012; Kassam-Adams, Fleisher, & Winston, 2009; McCarthy, Ashley, Lee, & Anderson, 2012) and, if unresolved, may evolve into longer-term posttraumatic stress symptoms.

Although numerous studies have examined posttraumatic stress reactions in parents of ill children (Bruce, 2006; Kassam-Adams et al., 2009; Landolt, Ystrom, Sennhauser, Gnehm, & Vollrath, 2012), fewer studies have investigated acute stress reactions within the first 4 weeks of the child's first hospitalization.

A recent literature review examining the early psychological reactions of parents (Woolf, Muscara, Anderson, & McCarthy, 2015) found between 12 and 68% of parents of ill or injured children suffer significant distress reactions in the first 3 months following their child's diagnosis or hospitalization. This large variability was attributed to methodological factors, including differences in study design, assessment timing, measurement tools, and scoring protocols. In addition, studies that have specifically investigated factors associated with parental stress within the first 4 weeks postdiagnosis are few in number, and most have focused on the parents of children from a single illness group or treatment setting, such as children who have suffered trauma (Bakker et al., 2012; Kassam-Adams et al., 2009), children who were admitted to pediatric or neonatal intensive care units (Balluffi et al., 2004; Lefkowitz, Baxt, & Evans, 2010; Shaw et al., 2006), and children newly diagnosed with Type 1 diabetes (Landolt et al., 2002) or cancer (McCarthy et al., 2012; Patino-Fernandez et al., 2008). This focus limits the extent common factors associated with early parental distress reactions, which may then be targeted through hospital-wide support systems, can be identified. This acute period when the ill child remains hospitalized provides a unique opportunity for early intervention to reduce parental distress and prevent further escalation of distress symptoms.

To date, research indicates that psychosocial variables, which are factors related to an individual's social functioning and psychological functioning, are strongly associated with a parent's acute stress reactions. Parents' subjective appraisal of the severity of the illness, and the degree to which they worry that their child might die, have been consistently associated with acute stress responses (Bakker et al., 2012; Kassam-Adams et al., 2009; Shaw et al., 2006). Additional factors include parent trait anxiety (McCarthy et al., 2012; Patino-Fernandez et al., 2008), family

psychosocial risk (McCarthy et al., 2012), family functioning (McCarthy et al., 2012; Shaw et al., 2006), and prior trauma exposure (Kassam-Adams et al., 2009).

Findings with respect to demographic variables have been mixed. A number of studies reported no association between acute parent stress reactions and factors such as ethnicity, socioeconomic status, family structure, parent age, sex and education, and child age and sex (Bakker et al., 2012; Kassam-Adams et al., 2009; Landolt et al., 2002; McCarthy et al., 2012; Patino-Fernandez et al., 2008; Shaw et al., 2006). In contrast, others have found that female sex, younger parental age (Bakker et al., 2012; Barrera, Atenafu, & Pinto, 2009; McCarthy et al., 2012), and lower maternal education (Vanderbilt, Bushley, Young, & Frank, 2009) are associated with greater stress responses.

Objective child illness factors, such as the severity of illness and length of hospital stay have typically not been associated with early distress reactions (Kassam-Adams et al., 2009; Landolt et al., 2002; Shaw et al., 2006); however, some studies have found specific factors, such as the severity of the child's pain (Kassam-Adams et al., 2009), having a brain tumor (McCarthy et al., 2012), and burn size (Bakker et al., 2012) to be associated with increased acute stress symptoms in parents.

To date, only two studies have explored and compared early psychological reactions in parents across different illness groups or treatment experiences (Landolt, Vollrath, Ribi, Gnehm, & Sennhauser, 2003; Muscara, McCarthy, et al., 2015). Although Landolt et al. (2003) assessed early distress reactions in parents of children either involved in an accident, or diagnosed with cancer or Type 1 diabetes mellitus, they used a measure assessing posttraumatic stress at 5–6 weeks posthospital admission rather than a measure of acute stress disorder specifically within the first 4 weeks of the event. They found that a cancer diagnosis was associated with greater posttraumatic stress reactions in parents, but parental distress levels were not associated with child or partner distress. In contrast, in a study comparing acute stress in parents of children across different treatment

experiences (acutely admitted to oncology, cardiology, or intensive care wards), Muscara¹ and colleagues (2015) found no association between the treatment experience and severity of parent acute stress reactions. Although the current study involves the same sample, other variables potentially associated with acute parental distress were not examined in the earlier study.

Importantly, early parental distress reactions have been found to be predictive of later parent adjustment and mental health (McCarthy et al., 2012), and more distressed parents tend to use significantly more hospital resources (Kazak et al., 2003²). Thus, the limited studies examining variables associated with acute parental stress responses across illness groups is a significant research gap. The recently updated integrative model of pediatric medical traumatic stress (integrative model; Price, Kassam-Adams, Alderfer, Christofferson, & Kazak, 2015) provides a theoretical heuristic to address this limitation within the literature. This model posits that not only are distress reactions common in parents across illnesses, but that preexisting psychosocial factors are important risk factors for parent mental health outcomes. Although available data provide preliminary support for the model, greater understanding of the factors impacting parents across illnesses or different treatment experiences is critical in helping to inform psychosocial screening and assessment in acute clinical settings, and how psychosocial screening approaches might extend beyond single treatment settings. This broader perspective potentially has implications for the development of psychosocial interventions for parents across the wider hospital setting. Interventions delivered across different treatment settings might benefit parents in terms of opportunities to share and learn from both common and different experiences with other parents, and might also be a more cost-effective use of often-limited hospital psychosocial staff resources. Finally, the importance of identifying and targeting parental distress responses is highlighted in the integrative model, which also proposes that the mental health of parents influences the psychosocial and physical recovery of the ill child (Price et al., 2015).

The aim of this study was to investigate the variables associated with acute stress symptoms in parents of seriously ill children within a pediatric hospital setting, and across a range of treatment settings, to gain a greater understanding of parent traumatic stress responses during this early period. The study examines parents of children admitted to three hospital units (oncology, cardiology, and intensive care), which are characterized by different treatment and care experiences. Within each unit there is considerable heterogeneity in the illnesses treated and there can be some overlap between units in the children seen. Nonetheless, they represent clinically relevant differences in care experiences that reflect the ranges of treatment provided in a large pediatric hospital setting. Based upon extant literature, it was hypothesized that psychosocial variables (parent trait anxiety, depression, and family functioning) would be more strongly associated with acute parent distress than demographic (parent and child age and sex, parent education) and child illness variables (treatment experience/setting, length of hospital stay).

Method

Participants

The study sample was drawn from the Take a Breath longitudinal cohort study of families impacted by life-threatening childhood illnesses, conducted at the Royal Children's Hospital (RCH), Melbourne, Australia. For the current study, cross-sectional data collected at the first acute time point (within 4 weeks of diagnosis or hospital admission of their child) were utilized.

Participants included parents of children diagnosed or admitted to the RCH with an illness or injury that involved a threat to the life or physical integrity of the child. Both mothers and fathers were invited to participate and each gave individual consent. Nonparticipation of one parent did not preclude the other parent from participation. Parents were recruited from the cardiology and oncology departments and pediatric intensive care unit (PICU) between November 2010 and August

2012. Inclusion criteria were as follows: parent of a hospitalized child aged 0 to 18 years diagnosed or admitted within the previous 4 weeks with a life-threatening illness, parent had an active and current parenting role with the hospitalized child, and it was the child's first presentation for the illness. Definitions of a life-threatening illness for each of the three hospital departments were cardiology—infant required surgery within the first month of life; oncology—new diagnosis of any cancer type; PICU—stay of 48 hours or more in PICU. Exclusion criteria included parent concurrent or recent experience of another major trauma within the last 2 months (e.g., death of a family member), limited spoken English and/or literacy, or a previous diagnosis of a chronic health condition in the child. All participating parents were eligible for standard hospital psychosocial care, which included access to a social worker and other services such as child and family therapists and referral to hospital-based mental health services if indicated.

Of the original sample ($N = 256$; Muscara et al., 2015), 171 parents from 127 eligible families agreed to participate and completed baseline data. More mothers ($n = 115$) than fathers ($n = 56$) consented to participation. There was no significant difference between the groups in average time to enrollment during the acute period (oncology: $M = 15.5$ days, $SD = 8.8$; cardiology: $M = 16.4$ days, $SD = 8.5$; PICU: $M = 16.4$ days, $SD = 7.8$). Participant characteristics by treatment setting are displayed in Table 1. With regard to the children admitted to oncology (i.e., the oncology treatment setting), 36.9% ($n = 24$) had leukemia, 41.5% ($n = 27$) had solid cancers, 18.5% ($n = 12$) had brain cancers, and 3.1% ($n = 2$) had another hematological condition. For children in the cardiology setting, 38.8% ($n = 19$) underwent biventricular repair (e.g., tetralogy of Fallot and transposition of the great arteries), 14.3% ($n = 7$) underwent single ventricle repair (hyperplastic left heart syndrome), and 46.9% ($n = 23$) underwent other surgeries. Within the PICU setting, 33.3% ($n = 19$) had cardiac disease, 33.3% ($n = 19$) had a severe respiratory illness,

14.1% ($n = 8$) sustained a trauma, 12.3% ($n = 7$) had a serious infectious disease, and 7.0% ($n = 4$) were admitted for other serious illnesses. Despite the apparent overlap and heterogeneity in illnesses across the treatment settings, these classifications are an accurate reflection of the presentations to these different hospital units, and reflect the different treatment and care experiences of the groups. They are therefore clinically relevant and highly representative samples of patients typically treated within these different hospital units within a large pediatric hospital setting. Importantly, no significant differences were found between the analytic sample and those lost to the study.

Parent and child demographic information, stratified by treatment setting, is displayed in Table 1. There were no differences by treatment setting in parent sex, education, country of birth, and relationship status, nor child sex or country of birth (all $p = .235$ to $.900$). There was a significant difference in parent age ($p = .033$), with post hoc Bonferroni tests showing that parents of children in the cardiology group were significantly younger than those in the oncology group ($p = .034$). A significant difference between groups was also seen in child age, with Bonferroni tests indicating significant differences in each pairwise comparison. On average, children in the cardiology group were the youngest and children in the oncology group were the oldest (all $ps \leq .011$). There were no differences in the number of parents within each treatment setting with clinically significant symptoms of acute stress.

Procedure

The study was approved by the RCH Human Research Ethics Committee (HREC 30044), Melbourne Australia. To identify eligible families, members of the research team monitored daily department admissions lists and liaised with clinical staff. A member of the research team obtained informed written consent and provided questionnaires to parents for return within 4 weeks of their

child's admission. After receiving consent, the child's hospital record was accessed to obtain diagnostic and treatment information. Participating parents who failed to return the questionnaires were reminded via e-mail, telephone, or text.</P>

<H2>Measures</H2>

<H3>Acute Stress Disorder Scale.</H3>

<P>Acute stress was assessed using the Acute Stress Disorder Scale (ASDS; Bryant, Moulds, & Guthrie, 2000). This is a 19-item self-report measure designed to assess acute stress disorder in individuals in the acute period (up to 4 weeks) following a traumatic event. The ASDS measures four clusters of symptoms: dissociation (five items), reexperiencing (four items), avoidance (four items), and arousal (six items). Internal consistency for the total score is high (Cronbach's α ; = .96; Bryant et al., 2000), as was internal consistency for the current study (Cronbach's α ; = .89). A total score of 56 or above indicates that the individual has significant symptoms of acute stress (Bryant et al., 2000).</P>

<H3>The Depression Anxiety Stress Scales-Short Form.</H3>

<P>The Depression Anxiety Stress Scales-Short Form (DASS; Lovibond & Lovibond, 1995) is a 21-item self-report instrument designed to assess depressive, anxiety, and general stress symptoms in the parents. However, given the close association between acute stress and other anxiety disorders and symptoms, only the depression scale was used for the current analyses. Respondents rate the extent to which they had experienced symptoms of depression over the past week on a 4-point scale. Scores range from 0 to 14, with higher scores indicating greater symptoms of depression. The DASS has been shown to have good internal consistency reliability for the Depression Scale (Cronbach's α ; = .88; Lovibond & Lovibond, 1995), which was replicated in our sample (Cronbach's α ; = .87).</P>

Psychosocial Assessment Tool.

Psychosocial risk factors were assessed using the Psychosocial Assessment Tool (PAT; Pai et al., 2008), which was designed for use with families of ill children. It comprises seven subscales; however, for the purpose of this study, only the Child Problems (8 items for children < 2 years of age, 15 items for children ≥ 2 years of age) and Family Problems subscales (8 items) were utilized. Subscale total scores are adjusted by dividing the number of endorsed high-risk items over the total number of items in each subscale. Adjusted subscale scores range in score from 0 to 1, with higher scores indicating higher psychosocial risk. In the present study, internal reliability was acceptable for both the Child Problems subscale (Cronbach's α = .70 for parents of children < 2 years; Cronbach's α = .79 for parents with children aged ≥ 2 years), and the Family Problems subscale (Cronbach's α = .63).

The State Trait Anxiety Inventory.

The State Trait Anxiety Inventory (STAI Y-2; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is a 20-item measure designed to assess trait anxiety in parents, which is a relatively stable construct involving anxiety proneness. Items on the STAI Y-2 are rated on a 4-point scale ranging from 1 = *almost never* to 4 = *almost always*. Higher scores indicate higher trait anxiety. Psychometric properties are well established and the internal consistency of the STAI Y-2 has been reported to be excellent (Cronbach's α = .91; Spielberger et al., 1983), as was the case in the present study (Cronbach's α = .93).

Demographic variables.

Demographic information was collected by parent report and included parent age, sex, level of education, country of birth, and marital status, as well as child age and sex. Level of education was measured as a dichotomous variable (completed high school or not completed high

school), as were country of birth (born in Australia or born outside of Australia) and marital status (married/partnered, or not married/partnered).</P>

<H3>Illness-related variables.</H3>

<P>Illness-related information was obtained via medical records. These variables included the type of illness and the length of hospital stay as a proxy measure of illness/injury severity.</P>

<H2>Data Analysis</H2>

<P>Differences between illness groups across demographic and medical variables and acute stress disorder symptoms were examined using analysis of variance (ANOVA) for continuous variables, or ² tests for categorical variables. To explore variables associated with acute stress symptoms, a hierarchical regression model was conducted. Given that much of the research to date has found that psychosocial factors are more strongly associated with parental distress, and demographic and medical variables are more weakly related, the psychosocial variables were entered first (Block 1), then demographic factors (Block 2), and finally illness-related factors (Block 3). All participants were complete data cases.</P>

<P>Power analyses indicate that between-group ANOVA models will have 80% power (and an error level of 0.05) to detect a medium effect size of $R^2 = .075$, and a medium-to-large effect size of $R^2 = .100$ for a multiple regression model with 12 predictors. Clustered robust estimation was used to account for observations from two parents in the same family. Ordinary least squares regression methods do not adequately accommodate correlated regression errors within clusters (Rogers, 1994), and so an unbiased estimator for clustered data was employed to handle potential heteroscedasticity (Williams, 2000). This method results in the same point estimates as noncluster adjusted models, but reports more conservative standard error estimates.</P>

Results

Results of the outcome and independent variables are shown in Table 2 (Table 2). There were no significant differences in scores across the treatment settings, with all groups scoring below the clinical cutoff for acute stress.

Results of the hierarchical regression are shown in Table 3 (Table 3). In terms of Block 1, trait anxiety, $b = 0.33$, 95% CI [0.03, 0.64], and depression, $b = 0.44$, 95% CI [0.17, 0.70], and child problems, $b = 12.50$, 95% CI [0.65, 24.34], were significantly associated with parental acute stress responses. Family problems were not found to be significantly related. This block, containing psychosocial factors, explained 36.8% of the variance in acute stress responses, $p < .001$.

The addition of demographic factors (Block 2) resulted in significantly more variance explained beyond Block 1 alone, $\Delta R^2 = 4.5\%$, $p = .022$. Trait anxiety, depression, and child problems remained significantly associated with parental acute stress, even after accounting for demographic factors. The single demographic variable significantly associated with acute stress was parent age with a younger parental age associated with higher acute stress responses, $b = -4.18$, 95% CI [-7.35, -1.01]. Overall, the regression model containing both Blocks 1 and 2 explained 41.4% of the variance in acute stress responses.

None of the illness-related factors contributed significantly to acute stress responses. Addition of Block 3 did not lead to a significant change in the R^2 value, $p = .698$. Trait anxiety, depression, child problems, and parent age all remained significantly related to parental acute stress responses.

<H1>Discussion</H1>

<P>The current study investigated the psychosocial, demographic, and illness-related factors associated with acute stress symptoms in parents of seriously ill children across various treatment settings, to improve our understanding of which parents are vulnerable to traumatic stress responses during this early period. As hypothesized, a number of psychosocial variables, specifically trait anxiety, depression, and child problems were all found to be significantly and strongly related to acute parent traumatic stress, explaining 36.8&percent; of the total variance of parent distress responses. As expected, demographic variables were not strongly associated with acute parent stress, with younger parent age explaining an extra 4.5&percent; of the variance. Finally, as predicted and consistent with previous literature, the illness-related variables did not make any significant contribution to the model.</P>

<P>Our results are consistent with the small body of literature that has explored factors associated with acute stress reactions in parents, and highlight the role of preexisting psychosocial factors in understanding parent responses to serious childhood illness or injury. Specifically, trait anxiety (McCarthy et al., 2012; Patino-Fernandez et al., 2008) and symptoms of depression (Lefkowitz et al., 2010; Vanderbilt et al., 2009), as well as child behavior problems (Barrera et al., 2004), have been previously found to be associated with early traumatic stress responses in parents. This suggests that mental health variables, such as a preexisting anxious temperament and experiencing symptoms of depression, as well as psychosocial variables such as child behavior problems within the family context, play a major role in how parents respond to having a critically ill child (Kazak et al., 1998). Importantly, these previous studies were only comprised of samples treated within a single illness group or treatment settings (e.g., oncology or neonatal intensive care), with the current study being the first to identify these mental health variables as important variables associated with acute stress reactions across various treatment settings and experiences within a hospital setting.</P>

Parent mental health variables were more strongly associated with their acute stress responses compared to parent-reported family problems. Previous literature has found that family functioning is inconsistently related to early parent distress outcomes (Patino-Fernandez et al., 2008; Shaw et al., 2006). These mixed results may reflect methodological differences or may indicate that perhaps intrapersonal coping may be a stronger and more important factor associated with parent acute stress outcomes than family functioning, at least in the acute stages postadmission.

The finding that a younger parental age was significantly associated with higher levels of acute distress is consistent with many studies examining mothers' and fathers' reactions to serious childhood illness (Barrera et al., 2009; McCarthy et al., 2012), although this is the first to confirm this association contemporaneously across different treatment settings and experiences. This finding is supported by the literature which has found that demographic variables tend to be less strongly or consistently related to parent acute parent distress reactions (see Woolf et al., 2015, for a review).

The results of the current study offer empirical support to the integrative model (Price et al., 2015), which posits that preexisting psychosocial factors—factors that parents bring into the situation—are important variables associated with parent outcomes, and that, in general, socioeconomic, demographic, and objective medical factors are not strongly related to parent distress reactions. An important aspect of this model is that it proposes that this is consistent irrespective of the child's illness, hence is relevant across illnesses. This contention is further supported by the current findings.

A number of clinical implications arise from these findings. Given that psychosocial variables were found to be the factors most strongly associated with acute parent distress, screening of parental and family psychosocial risk factors upon admission may help assist clinicians to identify which families may be at greater risk of developing acute distress reactions and later and more chronic mental health issues. This may assist in directing often scarce psychosocial resources to those parents and families most likely to benefit (Haverman et al., 2003; Kazak et al., 2007). Importantly,

given that illness factors and treatment settings do not appear to play an important role in predicting early parent reactions, the current findings support the implementation of a general psychosocial screening approach for parents and families across the wider hospital system. The PAT measure employed in this study was originally designed for families of children with cancer, but has now been utilized more broadly across illness groups (Hearps et al., 2014; Pai, Tackett, Ittenbach, & Goebel, 2012) and may be useful across a broader hospital psychosocial program of screening and assessment. There are also other screening tools evaluated within the literature, such as the parent stress thermometer (Haverman et al., 2003), that may also be potentially administered in this context.

There are also important implications for prevention and intervention. There is currently a lack of evidence-based interventions to reduce and prevent the development of significant mental health issues for parents. This is concerning given the significant impact parental mental health has on their ability to manage their parenting role, the functioning of the wider family unit, and on the recovery of the ill child (Landolt et al., 2012). The current findings indicate that there may be specific psychosocial risk factors that could be targeted to improve parent outcomes. Rather than targeting trait anxiety, which can be difficult to modify, interventions to specifically target cognitions associated with acute stress reactions, to improve or maximize social or family supports, or to reduce child behavioral issues that may exacerbate parent distress may be most useful. Importantly, this study supports the notion that rather than developing illness-specific interventions, early psychosocial interventions could be developed and delivered to parents irrespective of the child's illness type or treatment setting (Burke et al., 2014; Rayner et al., 2016).

This study has several limitations. Data were cross-sectional precluding conclusions about causal processes. Although data were cross-sectional this was necessary given our focus on acute stress reaction; it is not feasible to prospectively recruit a sample of parents whose children will go on to experience sudden life-threatening illness/injury. Data were mostly collected from a single

source. Although it is possible that the associations reported are inflated by shared method variance, recent work has shown that the extent to which this occurs has been overstated in the past (Lance, Dawson, Birkelbach, & Hoffman, 2010). In addition, a number of eligible parents were not able to be approached for participation due to their child being medically unstable and a sizable number of families declined participation, citing time constraints associated with the illness. Given strict privacy legislation, it was not possible to compare families that consented to participate with those who did not; therefore, any biases inherent within the sample could not be identified. Further, the exclusion of non-English speaking families due to the language requirement of the study may have limited the generalizability of the findings. The current sample involved parents of children admitted for a sudden and unexpected illness or injury. Results reported here may be unique to these types of admissions and should not be generalized to other admissions for chronic, long-term illness. There is also a discrepancy in the numbers of mothers and fathers in the sample, which was a result of the practical challenges of recruitment within a tertiary pediatric hospital setting. This is, however, a common and ongoing challenge within the literature. Finally, given that the cardiology group by definition only involved parents of infants, children in the cardiology group were significantly younger than those in the other groups. Although this difference has the potential to bias the findings, it has consistently been found within the literature that child age is not predictive of parent outcomes (Woolf et al., 2015). Despite these limitations, the current study is the first to systematically explore a wide range of potential factors associated with parent acute stress reactions across different child illnesses and treatment settings.

In summary, the current findings supported the study hypotheses, and the integrative model, indicating that psychosocial factors are the factors most strongly associated with acute parent distress reactions, and that demographic and objective medical factors are generally weakly related to outcome. These findings support the use of general psychosocial screening of parents upon the admission of their children to hospital, and the development of programs and interventions targeting

these psychosocial risk factors, across illness groups and treatment settings, and therefore across the wider hospital system.</P>

<H1>References</H1>

<REF>Bakker, A., Van Loey, N. E., Van der Heijden, P. G., & Van Son, M. J. (2012). Acute stress reactions in couples after a burn event to their young child. *Journal of Pediatric Psychology*, 37, 1127–1135. doi:10.1093/jpepsy/jss083

Balluffi, A., Kassam-Adams, N., Kazak, A. E., Tucker, M., Dominguez, T., & Helfaer, M. (2004). Traumatic stress in parents of children admitted to the pediatric intensive care unit. *Pediatric Critical Care Medicine*, 5, 547–553. doi:10.1097/01.PCC.0000137354.19807.44

Barrera, M., Atenafu, E., & Pinto, J. (2009). Behavioural, social and educational outcomes after pediatric stem cell transplantation and related factors. *Cancer*, 115, 880–889. doi:10.1002/cncr.24109

Barrera, M., D'Agostino, N. M., Gibson, J., Gilbert, T., Weksberg, R., & Malkin, D. (2004). Predictors and mediators of psychological adjustment in mothers of children newly diagnosed with cancer. *Psycho-Oncology*, 13, 630–641. doi:10.1002/pon.765

Bruce, M. (2006). A systematic and conceptual review of posttraumatic stress in childhood cancer survivors and their parents. *Clinical Psychology Review*, 26, 233–256. doi:10.1016/j.cpr.2005.10.002

Bryant, R. A., Moulds, M. L., & Guthrie, R. M. (2000). Acute Stress Disorder Scale: A self-report measure of acute stress disorder. *Psychological Assessment*, 12, 61–68.<zaq;7>

- Burke, K., Muscara, F., McCarthy, M., Dimovski, A., Hearps, S., Anderson, V., & Walser, R. (2014). Adapting acceptance and commitment therapy for parents of children with life-threatening illness: Pilot study. *Families, Systems, & Health, 31*, 122–127. doi:10.1037/fsh0000012
- Haverman, L., van Oers, H. A., Limperg, P. F., Houtzager, B. A., Huisman, J., Darlington, A., . . . Grootenhuis, M. A. (2003). Development and validation of the Distress Thermometer for parents of a chronically ill child. *Journal of Pediatrics, 163*, 1140–1146. doi:10.1016/j.jpeds.2013.06.011
- Hearps, S. J., McCarthy, M. C., Muscara, F., Hearps, S. J. C., Burke, K., Jones, B., & Anderson, V. A. (2014). Psychosocial risk in families of infants undergoing surgery for a serious congenital heart disease. *Cardiology in the Young, 24*, 632–639. doi:10.1017/S1047951113000760
- Kassam-Adams, N., Fleisher, C. L., & Winston, F. K. (2009). Acute stress disorder and posttraumatic stress disorder in parents of injured children. *Journal of Traumatic Stress, 22*, 294–302. doi:10.1002/jts.20424
- Kazak, A. E., Rourke, M., Alderfer, M., Pai, A., Reilly, A., & Meadows, A. (2007). Evidence-based assessment, intervention and psychosocial care in pediatric oncology: A blueprint for comprehensive services across treatment. *Journal of Pediatric Psychology, 32*, 1099–1110. doi:10.1093/jpepsy/jsm031
- Kazak, A. E., Stuber, M., Barakat, L., Meeske, K., Guthrie, D., & Meadows, A. (1998). Predicting posttraumatic stress symptoms in mothers and fathers of survivors of childhood cancers. *Journal of the American Academy of Child & Adolescent Psychiatry, 37*, 823–831. doi:10.1097/00004583-199808000-00012

- Lance, C. E., Dawson, B., Birkelbach, B., & Hoffman, B. J. (2010). Method effects, measurement error, and substantive conclusions. *Organizational Research Methods, 13*, 435–455.
- Landolt, M. A., Ribi, K., Laimbacher, J., Vollrath, M., Gnehm, H. E., & Sennhauser, F. H. (2002). Brief report: Posttraumatic stress disorder in parents of children with newly diagnosed diabetes. *Journal of Pediatric Psychology, 27*, 647–652. doi:10.1093/jpepsy/27.7.647
- Landolt, M. A., Vollrath, M., Ribi, K., Gnehm, H. E., & Sennhauser, F. H. (2003). Incidence and associations of parental and child posttraumatic stress symptoms in pediatric patients. *Journal of Child Psychology and Psychiatry, 44*, 1199–1207.
- Landolt, M. A., Ystrom, E., Sennhauser, F., Gnehm, H., & Vollrath, M. (2012). The mutual prospective influence of child and parental post-traumatic stress symptoms in pediatric patients. *Journal of Child Psychology & Psychiatry, 53*, 767–774. doi:10.1111/j.1469-7610.2011.02520.x
- Lefkowitz, D. S., Baxt, C., & Evans, J. R. (2010). Prevalence and correlates of posttraumatic stress and postpartum depression in parents of infants in the neonatal intensive care unit (NICU). *Journal of Clinical Psychology in Medical Settings, 17*, 230–237. doi:10.1007/s10880-010-9202-7
- Lovibond, P., & Lovibond, S. (1995). *Depression Anxiety Stress Scale*. Sydney, Australia: Psychology Foundation.
- McCarthy, M. C., Ashley, D. M., Lee, K. J., & Anderson, V. A. (2012). Predictors of acute and posttraumatic stress symptoms in parents following their child's cancer diagnosis. *Journal of Traumatic Stress, 25*, 558–566. doi:10.1002/jts.21745

Muscara, F., Burke, K., McCarthy, M. C., Anderson, V. A., Hearps, S. J. C., Hearps, S. J., . . .

Nicholson, J. M. (2015). Parent distress reactions following a serious illness or injury in their child: A protocol paper for The Take a Breath Cohort Study. *BMC Psychiatry*, *15*, 153.

doi:10.1186/s12888-015-0519-5

Muscara, F., McCarthy, M. C., Woolf, C., Hearps, S. J. C., Burke, K., & Anderson, V. A. (2015).

Early psychological reactions in parents of children with a life threatening illness within a pediatric hospital setting. *European Psychiatry*, *30*, 555–561.

doi:10.1016/j.eurpsy.2014.12.008

Pai, A. L., Patino-Fernandez, A. M., McSherry, M., Beele, D., Alderfer, M. A., Reilly, A. T., . . .

Kazak, A. E. (2008). The Psychosocial Assessment Tool (PAT2.0): Psychometric properties of a screener for psychosocial distress in families of children newly diagnosed with cancer.

Journal of Pediatric Psychology, *33*, 50–62. doi:10.1093/jpepsy/jsm053

Pai, A. L., Tackett, A., Ittenbach, R. F., & Goebel, J. (2012). Psychosocial Assessment Tool

2.0_General: Validity of a psychosocial risk screener in a pediatric kidney transplant sample.

Pediatric Transplantation, *16*, 92–98. doi:10.1111/j.1399-3046.2011.01620.x

Patino-Fernandez, A., Pai, A., Alderfer, M., Hwang, W.-T., Reilly, A., & Kazak, A. E. (2008).

Acute stress in parents of children newly diagnosed with cancer. *Pediatric Blood Cancer*, *50*, 289–292. doi:10.1002/pbc.21262

Price, J., Kassam-Adams, N., Alderfer, M., Christofferson, J., & Kazak, A. E. (2015). Systematic

review: A reevaluation and update of the integrative (trajectory) model of pediatric medical traumatic stress. *Journal of Pediatric Psychology*, *41*, 86–97.

doi:10.1093/jpepsy/jsv074

- Rayner, M., Dimovski, A., Muscara, F., Yamada, J., Burke, K., McCarthy, M., . . . Nicholson, J. M. (2016). Participating from the comfort of your living room: Feasibility of a group videoconferencing intervention to reduce distress in parents of children with a serious illness or injury. *Child and Family Behavior Therapy*, 38, 209–224.
doi:10.1080/07317107.2016.1203145
- Rogers, W. (1994). Regression standard errors in clustered samples. *Stata Technical Bulletin*, 3, 19–23.
- Shaw, R., Deblois, T., Ikuta, L., Ginzburg, K., Fleisher, B., & Koopman, C. (2006). Acute stress disorder among parents of infants in the neonatal intensive care nursery. *Psychosomatics*, 47, 206–212. doi:10.1176/appi.psy.47.3.206
- Spielberger, C., Gorsuch, R., Lushene, R., Vagg, P., & Jacobs, G. (1983). *Manual of the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Vanderbilt, D., Bushley, T., Young, R., & Frank, D. A. (2009). Acute posttraumatic stress symptoms among urban mothers with newborns in the neonatal intensive care unit: a preliminary study. *Journal of Developmental & Behavioral Pediatrics*, 30, 50–56. doi:10.1097/DBP.0b013e318196b0de
- Williams, R. L. (2000). A note on robust variance estimation for cluster-correlated data. *Biometrics*, 56, 645–646.
- Winston, F. K., Kassam-Adams, N., Garcia-Espana, F., Ittenbach, R., & Cnaan, A. (2003). Screening for risk of persistent posttraumatic stress in injured children and their parents. *Journal of the American Medical Association*, 290, 643–649.
doi:10.1001/jama.290.5.643

Woolf, C., Muscara, F., Anderson, V. A., & McCarthy, M. C. (2015). Early traumatic stress responses in parents following a serious illness in their child: A systematic review. *Journal of Clinical Psychology in Medical Settings*, 23, 53–66. doi:10.1007/s10880-015-9430-y

Table 1

Parent and Child Demographics Stratified by Treatment Setting

Variable	Oncology		Cardiology		PICU		χ^2	ES
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)		
Parent, Sex (male)	65		49		57			
	23	(35.4)	19	(38.8)	14	(24.6)	2.74	0.13 ^c
Parent age in years ^a	38.57	(7.91)	34.61	(9.30)	36.04	(7.35)	3.49 ^{b*}	.04 ^d
Education (> High school)	51	(78.5)	44	(89.8)	49	(86)	2.90	0.13 ^c
Country of birth (Australia)	56	(86.2)	39	(81.3)	50	(89.3)	1.38	0.09 ^c
Relationship status	60			(95.9)			1.56	

(Married/partnered)	(92.3)	47	51	(89.5)	0.10 ^c
Symptomatic:					
Acute stress disorder	15 (23.1)	5 (10.2)	14 (24.6)	4.08	0.15 ^c
Child,	50	32	45		
Sex (male)	29 (58.0)	20 (62.5)	26 (57.8)	0.21	0.04 ^c
Child age in years ^a	5.49 (4.31)	0.08 (0.04)	2.51 (3.87)	23.35 ^{b**}	.27 ^d
Length of stay (days) ^a	16.52 (9.39)	20.84 (7.52)	19.29 (9.36)	2.49 ^b	.04 ^d
Country of birth (Australia)	48 (96.0)	32 (100.0)	44 (97.8)	1.35	0.10 ^c

<TFN>Note. All models $df = 2$. ES = effect size; PICU = pediatric intensive care group.

^aMean value presented in n column and standard deviation presented in % column. ^b F value.

^cCramer's V . ^d R^2 .

* $p < .05$, significant post hoc Bonferroni test between oncology and cardiology groups. ** $p < .001$, significant post hoc Bonferroni tests between all groups.

<TN>Table 2

<TT>Observed Means and Standard Deviations of Outcome and Predictor Variables^a

<TC>Variable	Range	Oncology		Cardiology		PICU		<i>F</i>
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
<TB>Acute stress	19-95	46.45	14.87	42.08	11.31	42.72	14.81	1.57
Trait anxiety	20-80	35.92	10.30	37.22	10.51	37.07	9.24	0.41
Depression	0-42	7.69	7.42	6.57	7.01	7.58	8.82	0.01
Child problems	0-1	0.22	0.20	0.18	0.18	0.18	0.21	0.38
Family problems	0-1	0.16	0.19	0.13	0.14	0.14	0.16	0.59

<TFN>Note. For all models: $R^2 \leq .01$, $df = (1, 126)$, $p > .05$. PICU = pediatric intensive care unit.^aClustered analysis of variance, model significance, adjusting for within-couple variance.

<TN>Table 3

<TT>Hierarchical Regression Predicting Parental Acute Stress Responses From Psychosocial, Demographic, and Illness-Related Factors

Block	Variables	<TC>Robust					
		<i>b</i>	95% CI	<i>df</i>	<i>F</i>	Step R^2	ΔR^2
<TB>1. Psychosocial factors				(4, 126)	15.27	.37***	
	Trait anxiety	0.33*	[0.03, 0.64]				
	Depression	0.44**	[0.17, 0.70]				

Child problems	12.50*	[0.66, 24.34]				
Family problems	16.51	[-1.37, 34.40]				
2. Block 1 + Child and parent demographic factors			(9, 126)	9.80	.41***	.04*
Trait anxiety	0.32*	[0.00, 0.63]				
Depression	0.40**	[0.14, 0.66]				
Child problems	14.13*	[1.80, 26.47]				
Family problems	16.94	[-2.48, 36.36]				
Parent sex (male)	0.09	[-0.14, 0.32]				
Parent age (years)	-4.18*	[-7.35, -1.01]				
Child sex (male)	2.84	[-0.81, 6.49]				
Child age (years)	0.27	[-0.26, 0.79]				
Parent education beyond HS	-3.20	[-8.00, 1.60]				
3. Block 2 + Illness-related factors			(12, 126)	7.59	.42***	.01
Trait anxiety	0.34*	[0.03, 0.65]				
Depression	0.40**	[0.13, 0.68]				
Child problems	13.33*	[1.10, 25.56]				
Family problems	16.03	[-2.74, 34.80]				

Parent sex (male)	0.10	[-0.14, 0.33]
Parent age (years)	-4.34**	[-7.50, -1.17]
Child sex (male)	2.97	[-0.84, 6.78]
Child age (years)	0.13	[-0.54, 0.80]
Parent education beyond HS	-2.97	[-7.68, 1.74]
Child department (Cardio)	-2.19	[-7.62, 3.24]
Child department (PICU)	-2.94	[-7.84, 1.96]
Length of stay (days)	0.00	[-0.08, 0.08]

<TFN>Note. *b* = unstandardized beta coefficient; HS = high school; Cardio = cardiology group; H/S = high school; PICU = pediatric intensive care group.

p* < .05. *p* < .01. ****p* < .001.

<<enote>>AQ1: AU: Is this Muscara, Burke, and colleagues or Muscara, McCarthy, and colleagues?

<<enote>>AQ2: AU: Please include the Kazak et al., 2003 ref in the reference list

<<enote>>AQ3: AU: Is this Muscara, Burke, et al., 2015 or Muscara, McCarthy, et al., 2015?

<<enote>>AQ4: AU: Sentence edit OK?

<<enote>>AQ5: AU: Please cite this ref as Muscara, Burke, et al. within the text.

<<enote>>AQ6: AU: Please cite this reference in the text or omit it from the reference list.

<<enote>>AQ7: AU: Please provide the article's doi number.

Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:

Muscara, F;McCarthy, MC;Thompson, EJ;Heaney, C-M;Hearps, SJC;Rayner, M;Burke, K;Nicholson, JM;Anderson, VA

Title:

Psychosocial, Demographic, and Illness-Related Factors Associated With Acute Traumatic Stress Responses in Parents of Children With a Serious Illness or Injury

Date:

2017-06-01

Citation:

Muscara, F., McCarthy, M. C., Thompson, E. J., Heaney, C. -M., Hearps, S. J. C., Rayner, M., Burke, K., Nicholson, J. M. & Anderson, V. A. (2017). Psychosocial, Demographic, and Illness-Related Factors Associated With Acute Traumatic Stress Responses in Parents of Children With a Serious Illness or Injury. JOURNAL OF TRAUMATIC STRESS, 30 (3), pp.237-244. <https://doi.org/10.1002/jts.22193>.

Persistent Link:

<http://hdl.handle.net/11343/292985>