

Predictors of parent post-traumatic stress symptoms after child hospitalization on general pediatric wards: A prospective cohort study

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ABSTRACT

Objective: The aim of this study was to identify predictors of parental post-traumatic stress symptoms following child hospitalization.

Methods: In this prospective cohort study, a sample of 107 parents completed questionnaires during their child's hospitalization on pediatric (non-intensive care) wards and again three months after discharge. Eligible parents had a child expected to be hospitalized for three or more nights. Standardized questionnaires were used to assess parent distress during the child's hospitalization, parent coping strategies and resources, and symptoms of post-traumatic stress after the hospitalization. Correlations and multiple regressions were used to determine whether parent distress during hospitalization and coping strategies and resources predicted post-traumatic stress symptoms three months after the child's discharge, while controlling for relevant covariates.

Results: Three months after the child's hospital discharge, 32.7% of parents ($n = 35$) reported some degree of post-traumatic stress symptoms, and 21.5% ($n = 23$) had elevated (≥ 34) scores consistent with a probable diagnosis of post-traumatic stress disorder. In the multivariable model, parent anxiety and uncertainty during hospitalization and use of negative coping strategies, such as denial, venting and self-blame, were associated with higher post-traumatic stress symptoms scores at three months post-discharge, even after controlling for the child's health status. Parental anxiety and depression during hospitalization moderated the relationship between negative coping strategies and post-traumatic stress symptoms.

Conclusions: More than one quarter of parents of children hospitalized on pediatric (non-intensive care) wards experienced significant post-traumatic stress symptoms after their child's discharge. Parents' hospital-related anxiety, uncertainty and use of negative coping strategies are potentially modifiable factors that most strongly influenced post-traumatic stress symptoms. Further research is urgently needed to test the effectiveness of different methods to provide psychological, emotional and instrumental support for parents, focusing on increasing parent coping resources and reducing distress during hospitalization.

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What is already known about the topic?

- Post-traumatic stress symptoms are common among family members of intensive care unit patients, but little is known about parents of children hospitalized on general pediatric wards.
- High parental distress during a child's hospitalization is a barrier to effective involvement in a child's care, can adversely affect the child, and is associated with negative long-term adjustment of parents and children.

What this paper adds

- Parent post-traumatic stress symptoms are associated with hospital-related stress even when controlling for other known predictors such as length of hospital stay, single parent status and the child's health status following hospitalization.
- Parent anxiety, uncertainty and negative coping style during child hospitalization are positively associated with post-traumatic stress symptoms among parents three months after their child's discharge; the effect of negative coping style is moderated by anxiety and depression.

1. Introduction

One in every 10–15 children in England and an estimated 1 in every 19 children in the US are hospitalized each year for a wide range of surgical and non-surgical conditions (National Health Service (England), 2013, U.S. Department of Health and Human Services et al., 2012). Although outcomes are generally good, there has been growing awareness over the past several decades of the psychological trauma for children and their parents that can occur with hospitalization and which can undermine the child's recovery and overall well-being of the family.

Child hospitalization can be stressful for parents regardless of the child's acuity or diagnosis (Commodari, 2010; Franck et al., 2010; Nabors et al., 2013). However, research has focused on the psychological and social stresses experienced by parents of children with specific medical conditions (e.g., cancer (Hoekstra-Weebers et al., 2012), burns (Hall et al., 2006), traumatic injury (Kassam-Adams et al., 2009), cardiac surgery (Helfricht et al., 2008), preterm birth (Shaw et al., 2009) or in specific contexts (e.g., intensive care (Colville et al., 2009; Landolt et al., 2003)). High parental distress (i.e., anxiety, depression, uncertainty) is a barrier to effective participation in their child's care and can adversely affect the hospitalized child (Power and Franck, 2008). It has also been associated with negative long-term adjustment for parents and children (Alisic et al., 2011; Dunn et al., 2012; Kassam-Adams et al., 2009; Landolt et al., 2003; Nugent et al., 2007).

Research regarding the long-term effects of hospital-related stress, also known as medical trauma, on family members has predominantly focused on relatives of patients with life-threatening or life-limiting illnesses. A recent review of the literature suggests that a significant number (30–70%) of family members of intensive care unit (ICU) patients experience symptomatic anxiety and

depression, or post-traumatic stress symptoms (PTSS) for months or years afterwards (Davidson et al., 2012). The prevalence of symptoms consistent with a diagnosis of post-traumatic stress disorder (PTSD) is estimated to be 10–40% in parents of children with potentially life-threatening or life-limiting conditions (Bronner et al., 2009; Horsch et al., 2007; Landolt et al., 2003; Stoppelbein et al., 2013). Among the proposed risk factors for PTSS in family members are younger age and female gender, a lower educational level, unpartnered status, pre-existing anxiety or depression (or both), other mental illness (or family history of), and lack of social support. Patient characteristics such as young age, chronic and/or life-limiting illness also increase the baseline risk for acute stress disorder and PTSS in family members. The hospital experiences of family members also influence their risk for PTSS. These include factors related to the patient's clinical course, distance between home and hospital, communication with health professionals, satisfaction with care, uncertainty and involvement in decision-making, as well as personal factors such as anxiety, depression, and degree of social support.

Research on stress and coping of parents whose children are hospitalized for life-threatening conditions is consistent with the post-intensive care syndrome – family (PICS-F), a term coined by the task force of the Society of Critical Care Medicine (Davidson et al., 2012) to represent PTSS and related complications experienced by families after their loved one's ICU hospitalization. However, there remains a lack of clarity regarding the relationships between the pre-existing and hospital experience factors when a child is hospitalized on a general pediatric ward. For example, parental coping resources, uncertainty and social support are thought to moderate or mediate parental stress when a child is ill, but research has not yet produced a definitive model of the interactions (Barrera et al., 2004; Hoekstra-Weebers et al., 2012; Santacroce, 2003).

In a recent study of parents residing in a Ronald McDonald House® (RMH) during their child's hospitalization, family functioning mediated the relationship between family hardiness and caregiver anxiety, with both family functioning and hardiness reducing anxiety during the hospitalization (Nabors et al., 2013). Distance from the hospital has also been shown to affect family function when children have chronic conditions (Yantzi et al., 2001).

Less is known about the factors that interact to affect post-hospital mental health for parents. Only one small study was found that compared mental health outcomes of parents of children admitted to pediatric ICU with those of parents of children admitted to a general pediatric ward. The study found that 27% (9/33) of parents of ICU-admitted children developed PTSS compared with 7% (2/29) for ward-admitted children, but there were no differences in anxiety or depression between the two groups (Rees et al., 2004).

PTSS is likely to have negative long-term effects on the adjustment of both parents and children (Bakker et al., 2010), although the majority of work in this area has been conducted in the field of oncology. For example, the impact of PTSS on subsequent psychological adjustment was

studied in a group of childhood cancer survivors and their mothers while controlling for the effects of other stressful life events and the appraisal of life threat and treatment intensity (Barakat et al., 2000). PTSS at baseline significantly predicted later general adjustment of children and mothers at follow-up, highlighting the importance of early identification of PTSS and appropriate intervention.

1.1. Proposed conceptual model

Based on the body of research specific to parents of hospitalized children and the risk factors of PICS-F previously identified, a conceptual model was proposed to describe the relationships between parent demographics, coping strategies and resources, hospital-related distress, child health and hospitalization factors and PTSS at three months after discharge. In the proposed model (Fig. 1), all of these factors have an independent influence on the development of PTSS. This model was used to guide the exploration of the relationships between the model's main elements in a sample of parents of children hospitalized on general (non-ICU) wards with a variety of acute and chronic conditions.

1.2. Study aims

The main purpose of this study was to identify potentially modifiable factors that predicted parent PTSS

three months after the child's hospitalization, while controlling for contextual factors. A secondary purpose was to explore the nature of the relationships between identified predictors of PTSS. Increased knowledge of such factors and their relationships to each other is essential to develop effective screening and intervention strategies to promote and preserve post-hospital parent and child mental health (Kassam-Adams et al., 2009; Needham et al., 2012).

2. Methods

This paper reports the main findings of the StayClose Study, a prospective cohort study of parental and child distress and coping during and after child hospital admission. A StayClose pilot study based on the first 29 parent participants (Wray et al., 2011) and an analysis of parent sleep quality (Franck et al., 2014) have been previously published. The focus of this analysis was to determine whether parental coping strategies/resources and distress during child hospitalization on general pediatric wards predicted PTSS three months after their child's discharge. The three-month follow-up period was chosen to allow sufficient time for the family to resume their usual family activities and to be able to distinguish PTSS from the initial response to trauma (Weiss, 2004). The study was conducted during 2009–2011 at a 72-bed tertiary referral children's hospital in the United Kingdom.

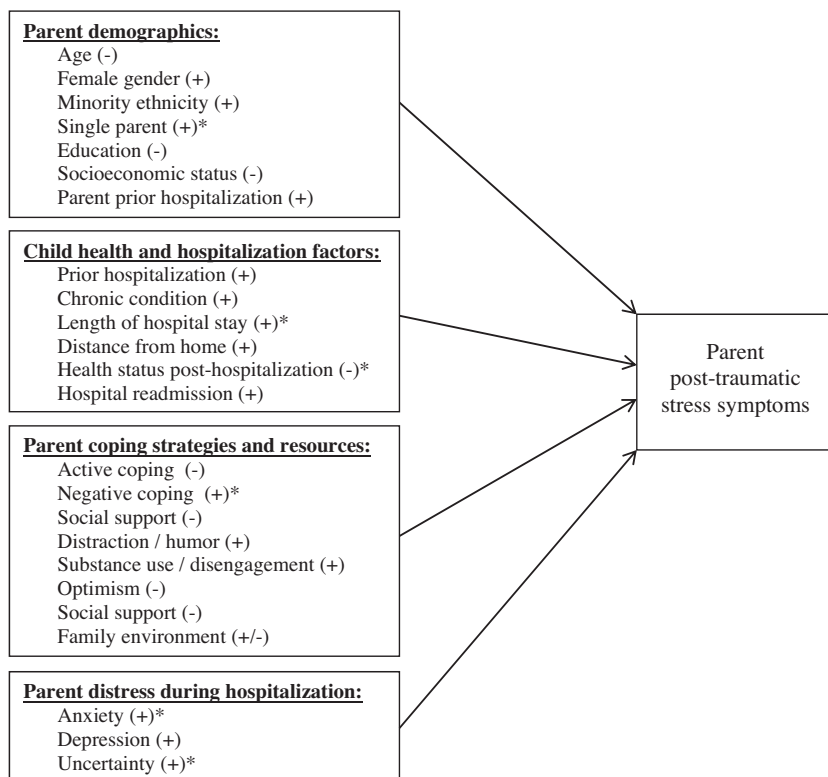


Fig. 1. Conceptual model of post-traumatic stress among parents following child hospitalization. (+) factors are expected to be associated with increased post-traumatic stress, while (-) factors are expected to be associated with decreased post-traumatic stress. (*) factors had significant bivariate associations with PTSS in this sample.

The hospital has an 18-room RMH located on the premises that provides accommodation and support services to families. The research was approved by the National Research Ethics Service (England). Parents (or primary caregivers) were eligible for inclusion if their child was expected to be hospitalized for three or more nights, the parents spoke English, and they were able to give informed consent.

2.1. Procedures

Each day, a member of the research team identified all new and expected admissions on each ward and gave all eligible families written information about the study. The researcher discussed the study with the child's parents and if one or both wanted to participate, obtained written consent and initial questionnaires from them. Parent participants completed the initial questionnaires within three days of the child's hospital admission. Three months after the child's hospital discharge, a follow-up questionnaire set was sent to the parent participant for completion and return in a reply-paid envelope. If follow-up questionnaires were not received within two weeks, one reminder was sent along with an additional questionnaire set.

2.2. Measures

Demographic and clinical information were collected from medical records and parent questionnaires including: child age, ethnicity, diagnosis, previous hospital experience, parental age, employment status, and family composition. Parents were also asked questions about the distance and travel time between the family's home and hospital. In addition, the seven standardized questionnaires listed below were administered to assess elements of parent hospitalization-related distress and coping strategies and resources that have been previously identified as relevant to the primary outcome of PTSS (Brewin and Holmes, 2003; Davidson et al., 2012; Kassam-Adams et al., 2009). The first six questionnaires were administered within three days of the child's hospital admission to assess parent coping strategies and resources (dispositional coping, social support, family environment and optimism) as well as hospital-related distress (anxiety, depression and uncertainty). The initial questionnaires took approximately 30–45 min to complete and participants may have completed them in a single sitting or over 1–2 days. The final standardized questionnaire took approximately 30 min and was administered three months after the child's hospital discharge to assess the primary outcome of PTSS as well as the child's current health status, and any readmissions that had occurred since the child's discharge. The following standardized questionnaires were administered in the same order to each parent, as indicated below:

Hospital Anxiety and Depression Scale (HADS): a 14-item questionnaire with 2 subscales measuring anxiety and depression. Each subscale has 7 items and total scores range from 0 to 21. Scores of 0–7 are considered as normal, with 8–10 indicating mild, 11–14 moderate and 15–21 severe levels of anxiety or depression (Zigmond and Snaith,

1983). It has demonstrated validity and reliability (Bjelland et al., 2002), and in this sample, the Cronbach's alpha coefficients were .81 for both the anxiety and depression subscales.

Brief COPE: a 28-item scale measuring dispositional coping. It includes 14 subscales measuring different coping mechanisms, each with 2 items. Subscale scores range from 0 to 8, with higher scores indicating greater use of that coping style. The scale has demonstrated validity and reliability (Carver, 1997), and Cronbach's alpha was .72 for this sample. The COPE author recommends that the composition of higher order factors be determined by factor analysis for the sample under investigation (Carver, 2013). Hence, an exploratory principal components factor analysis was performed with the present sample. A promax rotation was utilized because of inter-item correlations. Based on the results of screen tests and eigenvalues > 1 , a five-factor solution was examined. Item loadings > 0.40 were considered significant. The five-factor solution (active coping, negative coping, social support, distraction/humor and disengagement/substance use) accounted for 63% of the variance and was consistent with previous conceptualizations (Compas et al., 2012; Stoppelbein et al., 2013).

Duke-UNC Functional Social Support Questionnaire (SS): an 8-item scale assessing social support, with 2 additional items addressing support with household tasks and child care. Mean scores range from 1 to 5, with higher scores indicating more perceived social support. The scale has demonstrated validity and reliability (Broadhead et al., 1988), and Cronbach's alpha was .92 for this sample.

Family Environment Scale (FES): Two of the 3 scales of the FES were used (Family Relationship Index and System Maintenance), resulting in a 45-item questionnaire with 5 subscales measuring family cohesion, expressiveness, conflict, organization, and control. Each item is scored as true or false, and scores on each subscale can range from 0 to 9 (Moos and Moos, 1994). The scale has demonstrated validity and reliability (Moos, 1990). Cronbach's alpha coefficients in this sample were .60 for the control subscale, .62 for cohesion, .66 for expressiveness and organization, and .74 for conflict.

Life Orientation Test – Revised (LOT-R): a 10-item questionnaire measuring dispositional optimism. Total scores range from 0 to 30, with higher scores indicating greater optimism. The scale has demonstrated validity and reliability (Scheier et al., 1994), and Cronbach's alpha was .85 for this sample.

Parent Perception of Uncertainty in Illness (PPUS): a 31-item questionnaire assessing parental appraisal of uncertainty in relation to their child's illness. Total scores range from 0 to 155, with higher scores indicating greater uncertainty. There are four subscales. Ambiguity is the absence or vagueness of cues concerning the planning and carrying out of the child's care. Lack of clarity refers to the degree that information about the child's treatment and system of care is received or perceived as intricate and ill-defined. Lack of information is the absence of information concerning diagnosis and seriousness of illness. Unpredictability refers to the inability to make daily or future

predictions concerning symptomatology and illness outcome. The scale has demonstrated validity and reliability (Mishel, 1983), and Cronbach's alpha for the total score was .80 for this sample.

Impact of Events Scale – Revised (IES-R): a 22-item questionnaire that was administered three months after the child's hospital discharge to assess post-traumatic stress symptoms over the previous week. IES-R scores are reported either as total scores ranging from 0 to 88 or as mean scores ranging from 0 to 4, with higher scores indicating greater post-traumatic stress. A total score of 34 or above has been used to indicate "elevated PTSS" and is consistent with a probable diagnosis of PTSD (Dunn et al., 2012). The questionnaire assesses subjective distress related to a traumatic event (child's hospitalization) in the domains of intrusion, arousal and hyper-vigilance (Weiss and Marmar, 1997). This scale has demonstrated validity and reliability (Sundin and Horowitz, 2002). Cronbach's alpha in this sample was .95 for the total scale and ranged from .84 to .91 for the three subscales.

2.3. Data analysis

Quantitative data were summarized using IBM® SPSS® Statistics 20 (Somers, NY, USA). Descriptive statistics were computed for all variables. Group comparisons on categorical variables were conducted using chi-square tests of independence. Associations between PTSS (IES-R score) three months following child hospitalization and potential predictor variables were assessed using Pearson correlation coefficients (r). Hierarchical multiple regression analysis was used to determine the unique relationships of parent coping strategies and resources and distress during the child's hospitalization to PTSS, while controlling for relevant demographic, hospitalization-related, and post-discharge factors. Given the large number of potential predictors and the relatively small sample, only variables correlated with PTSS at a significance level of $p < .01$ ($r \geq .25$) were included in the regression model. Two-way interactions between variables included in the regression model were evaluated and retained if $p < .05$. A sample size of at least 100 is sufficient to detect moderate effects ($r = .30$) with 80% power and a significance level of $p < .05$.

3. Results

There were 362 eligible families during the study period. Of these, 28 parents declined to participate (7.7%), 81 agreed to participate but did not complete the hospital assessment (mainly due to early discharge or deterioration of the child's condition requiring transfer to the ICU), and 253 parents completed the assessment during the child's hospitalization. There were 109 (43%) three-month follow-up questionnaires returned. Questionnaires from two parents were excluded due to missing PTSS scores (see Fig. 2). The 107 parents completing both the hospital and three-month follow-up assessments were more likely than the 146 parents completing only the hospital assessment to be over 30 years of age (84% vs 71%, $\chi^2_{1,n=265} = 6.16$, $p = .013$) and to have a hospitalized child over 1 year of age

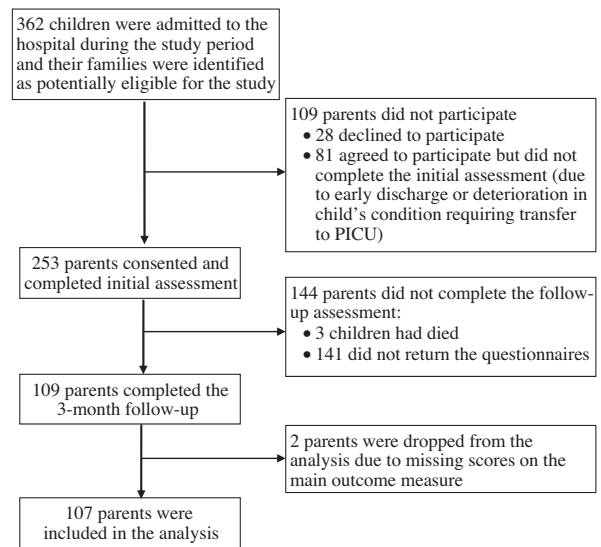


Fig. 2. Participant flow chart.

(81% vs 66%, $\chi^2_{1,n=265} = 7.60$, $p = .006$). However, they did not differ on the HADS or PPUS. Descriptive data for the 107 parents included in the analysis and their children are presented in Table 1. Participating parents were most often mothers (85%), and the remaining 15% were fathers. Approximately half had college or post-graduate education (51%), and most were not employed outside the home (62%). Their children had a variety of diagnoses spanning all major childhood conditions, with 65% having a chronic condition and 64% having one or more prior hospitalizations.

Measures of parent distress during the child's hospitalization, coping strategies and resources, and PTSS three months after hospitalization are presented in Table 2. Nearly half of the parents experienced moderate or severe anxiety during the child's hospitalization and nearly a third experienced moderate or severe depression. Uncertainty was moderate and within the range previously reported for parents of hospitalized children. The mean score for lack of clarity (information about the child's treatment and system of care) was slightly higher than previously reported (Mishel, 1997).

Three months after hospital discharge, 21.5% of parents reported some symptoms of post-traumatic stress, and 32.7% had elevated PTSS scores consistent with a probable diagnosis of PTSD (Bienvenu et al., 2013; Dunn et al., 2012; Rash et al., 2008). Scores were highest for the intrusion subscale and lowest for the hyperarousal subscale and only six parents reported no PTSS.

Parental PTSS three months following the child's hospitalization was associated with a number of factors proposed in the model (Table 3). PTSS was positively associated with the use of negative coping (denial, self-blame, and venting) and was negatively associated with optimism. Greater parent distress (anxiety, depression, and uncertainty) during the child's hospitalization was associated with higher PTSS three months after discharge. PTSS at three months after discharge was also associated

Table 1
Sample characteristics (N = 107).^a

Characteristics	mean (SD), range or number (%)
<i>Parent/caregiver characteristics</i>	
Relationship to child (n = 106) ^a	
Mother	90 (85%)
Father	16 (15%)
Partnered (rather than single) (n = 106) ^a	87 (82%)
Race/ethnicity: Caucasian	95 (89%)
Employed outside the home (n = 104) ^a	39 (38%)
Educational level (n = 102) ^a	
Secondary	50 (49%)
College/University	29 (28%)
Post-graduate	23 (23%)
Any previous hospital admission (n = 106) ^a	25 (24%)
<i>Family characteristics</i>	
Below median Index of Multiple Social Deprivation (%) ^b	23 (21.5%)
Families with other children (n = 104) ^a	66 (63%)
Families with other children previously admitted to hospital (n = 101) ^a	47 (47%)
<i>Child characteristics</i>	
Age in years	8.3 (6.1), 0–18
Gender: male	60 (56%)
Any previous hospital admission	69 (64%)
Chronic (rather than acute) condition	70 (65%)
Primary diagnosis	
General medical	41 (38%)
Surgical	35 (33%)
Oncology	13 (12%)
Neurological	12 (11%)
Cardiac	6 (6%)
<i>Hospital stay characteristics</i>	
Length of this hospital stay in days (median = 6.0)	10.5 (13.1), 2–88
Distance between family's home and hospital in miles	38 (32), 2–200
Travel time between family's home and hospital in minutes	56 (39), 5–240
<i>Post-discharge characteristics</i>	
Number re-admitted within 3 months of discharge (n = 106) ^a	40 (38%)
Child's health rating (1 = very ill, 5 = very healthy)	3.87 (0.92), 2–5

^a Some variables have a sample size less than 107 due to missing data, as specified.

^b Department of Communities and Local Government. The English Indices of Deprivation 2010. London: Department of Communities and Local Government, 2011.

with several demographic, hospitalization-related, and post-discharge characteristics, including single parent status, longer hospital stay, prior child hospitalization, re-hospitalization of the child, and poorer child health after discharge. PTSS was not associated with the child's age or gender, chronic or acute illness, the parent's relationship to the child (mother vs father), race/ethnicity, education level, employment status, or socio-economic status, the number of other children in the family, prior hospitalization of the parent or another child, the distance or travel time from the family's home to the hospital, any of the family environment subscales, or with the parent's rating of social support during hospitalization. Thus, these variables were excluded from subsequent analyses.

3.1. Prediction model of post-traumatic stress symptoms

A hierarchical multiple regression analysis was conducted to determine the unique contributions of parent distress during the child's hospitalization, as well as coping strategies and resources, to subsequent PTSS, while controlling for relevant, but largely unmodifiable demographic or child health and hospitalization-related factors. Variables from Table 3 that were significantly correlated ($r \geq .25$, $p < .01$) with PTSS were entered into the model in three steps: (1) single parent status, child hospital length of stay and the parent's rating of the child's health three months after discharge were entered first because they were non-modifiable factors in this model, (2) parent use of negative coping strategies and optimism were entered next as potentially modifiable dispositional factors, and (3) parent anxiety, depression, and uncertainty during the child's hospitalization were entered last as modifiable hospital experiential factors. Each step resulted in a significant ($p < .05$) increase in the model's R^2 , with 5 of the 8 predictors uniquely and significantly associated with PTSS: being a single parent; the parent's perception of their child's health three months after discharge, use of negative coping strategies, and parent anxiety and uncertainty during the child's hospitalization. Moderating effects were then explored and two significant two-way interactions were found, between negative coping strategies and anxiety and between negative coping strategies and depression (Fig. 3). These findings indicate that the effect of parental use of negative coping strategies on PTSS is amplified in the context of anxiety and attenuated in the context of depression (Table 4 and Fig. 4a and b).

4. Discussion

The results of this study indicate that many parents experience high levels of distress (anxiety, depression, uncertainty) when their child is hospitalized, and confirm our pilot study findings (Wray et al., 2011). Although the psychological and social experiences of parents whose children are hospitalized have been previously reported, the focus of these earlier studies was mainly on specific illness groups, such as children with cancer (Dunn et al., 2012; Hoekstra-Weebers et al., 2012), low birth-weight infants (Shaw et al., 2009), or particular hospital experiences such as an ICU stay (Colville et al., 2009) or cardiac surgery (Helfrich et al., 2008). In contrast, the current study focused on the non-ICU population and was inclusive of a broad range of medical and surgical conditions, with the majority of children in the sample having a length of stay of less than one week. We found that in this non-ICU sample, elevated PTSS consistent with a probable diagnosis of PTSD were reported by a significant minority of parents and that the frequency and intensity of symptoms were within the range reported for parents of children with a critical illness (Rees et al., 2004), although somewhat less than that reported after a cancer diagnosis (Dunn et al., 2012). Although more than half of the children had a chronic condition and/or previous hospitalizations, these factors did not fully account for the frequency of PTSS symptoms, which occurred in a significant minority of

Table 2Measures of parent distress during child hospitalization, coping strategies and resources, and post-traumatic stress three months after discharge ($N = 107$).

	Mean (SD)	Range	<i>n</i> (%)
During hospitalization			
<i>Parent distress</i>			
Anxiety (HADS)			
Mean score (SD)	10.02 (4.20)	3–21	
Number (%) of scores > 10			48 (45%)
Depression (HADS)			
Mean score (SD)	7.63 (4.36)	0–17	
Number (%) of scores > 10			32 (30%)
Uncertainty (PPUS) ^a	88.7 (14.4)	61–135	
<i>Parent coping strategies & resources</i>			
Active coping (COPE)	5.94 (1.24)	2–8	
Active coping	6.17 (1.53)	2–8	
Planning ^a	5.91 (1.55)	2–8	
Acceptance ^a	6.13 (1.53)	2–8	
Positive reframing	5.52 (1.72)	2–8	
Negative coping (COPE)	4.05 (1.21)	2–7.3	
Denial	2.95 (1.41)	2–7	
Self-blame ^a	4.78 (1.92)	2–8	
Venting ^a	4.47 (1.61)	2–8	
Social support coping (COPE)	4.86 (1.36)	2–8	
Instrumental support ^a	5.49 (1.65)	2–8	
Emotional support	5.57 (1.82)	2–8	
Religion ^a	3.44 (2.12)	2–8	
Distraction/humor (COPE)	4.76 (1.32)	2–8	
Self-distraction ^b	5.13 (1.56)	2–8	
Humor ^b	4.39 (1.73)	2–8	
Disengagement/substance use (COPE)	2.73 (0.98)	2–7	
Behavioral disengagement	2.81 (1.28)	2–8	
Substance use	2.65 (1.21)	2–7	
Optimism (LOT-R) ^b	18.7 (5.9)	6–30	
Social support (SS) ^b	37.0 (9.76)	11–50	
Family cohesion (FES)	7.54 (1.60)	1–9	
Family expressiveness (FES)	6.14 (1.99)	1–9	
Family conflict (FES)	2.12 (2.02)	0–8	
Family organization (FES)	5.79 (2.21)	1–9	
Family control (FES)	3.94 (2.11)	0–9	
3-Month follow-up			
<i>Post-traumatic stress symptoms (IES-R)</i>			
Intrusion subscale	7.54 (7.30)	0–27	
Avoidance subscale	5.77 (5.79)	0–27	
Hyperarousal subscale	4.37 (5.49)	0–22	
Total score	17.7 (17.1)	0–73	
Number (%) of scores ≥ 22 ^b			35 (32.7%)
Number (%) of scores ≥ 34 ^c			23 (21.5%)

COPE = Brief COPE scale; FES = family environment scale; HADS = Hospital Anxiety and Depression Scale; IES-R = Impact of Events Scale – Revised; LOT-R = Life Orientation Test – Revised; PPUS = parent perception of uncertainty in illness; SD = standard deviation; SS = Duke-UNC Functional Social Support Questionnaire.

^a $n = 106$ due to missing data

^b IES-R scores ≥ 22 indicate the presence of at least some post-traumatic stress symptoms

^c IES-R scores ≥ 34 are consistent with a probable diagnosis of post-traumatic stress disorder (Dunn et al., 2012).

parents, some of whose children had a relatively short hospital stay. We also found that PTSS symptoms below the PTSD diagnostic threshold were prevalent. These results suggest that parents of children hospitalized on general wards are similarly at risk for PTSS as are parents of children cared for in ICU settings. Given the large number of children hospitalized each year, the incidence of hospital-related distress and the persistence of post-traumatic symptoms is a significant public health concern, with negative mental and physical health effects for parents and children (Kassam-Adams et al., 2009).

We explored the influence of a comprehensive list of largely non-modifiable parent demographic factors in this analysis. None of the factors, however, with the exception

of being a single parent were associated with PTSS in the adjusted model. Further research is needed to confirm this finding and to develop better ways to support single parents when their child is hospitalized to reduce the risk of PTSS. Among the child health and hospitalization factors explored, only LOS and parent rating of the child's post-hospitalization health were retained in the model. These findings confirm that the degree of exposure to acute stress is a significant risk factor for PTSS. Thus, follow-up care should be offered to parents of children with long LOS and children with ongoing health needs, and community health care providers should be aware of the increased risk of PTSS in these parents and provide screening and support as needed.

Table 3

Correlation matrix of predictors of parent post-traumatic stress symptoms.

	PTSS	1	2	3	4	5	6	7	8	9	10	11	12	13
Non-modifiable factors														
1. Single parent	.251													
2. Child prior hospitalization	.194	.247												
3. Length of stay	.254	-.021	-.001											
4. Child readmission	.242	-.165	.014	.281										
5. Child's health	-.372	-.232	-.276	-.226	-.353									
Coping strategies/resources														
6. Active coping	-.074	-.123	.073	.053	-.016	.158								
7. Negative coping	.350	.207	.173	.124	-.009	-.115	-.159							
8. Social support coping	.005	-.124	.037	.009	.142	.131	.375	-.060						
9. Distraction/humor	.055	.070	.032	.034	-.141	.034	.200	.155	.122					
10. Disengagement/substance use coping	.136	.150	.058	.100	.013	-.128	-.258	.209	-.110	.106				
11. Optimism	-.265	-.271	-.261	-.053	-.051	.265	.357	-.417	.307	.052	-.119			
Parent distress in hospital														
12. Anxiety	.488	.032	.055	.332	.271	-.257	-.247	.417	-.125	-.116	.132	-.407		
13. Depression	.273	.023	.017	.266	.256	-.336	-.223	.323	-.182	-.180	.104	-.271	.636	
14. Uncertainty	.311	.056	.078	.136	.277	-.307	.003	.114	-.022	.041	-.023	-.274	.269	.278

Note: PTSS = post-traumatic stress symptoms as measured by the Impact of Events Scale – Revised (IES-R). PTSS was unrelated to: child age or gender, chronic vs acute illness, parent relationship to child (mother vs. father), parent race/ethnicity, education level, employment status, or socio-economic status, number of other children in the family, prior hospitalization of another child, prior parent hospitalization, distance or travel time from family's home to the hospital, all family environment measures, and social support during hospitalization. Bold variables had significant associations with PTSS ($r \geq .25$ and $p < .010$) and were included in the multivariable regression analysis. Correlations (r) $> .19$ are associated with $p < .05$, $r > .25$ with $p < .01$, and $r > .30$ with $p < .001$.

A number of dispositional coping strategies have been associated with parental mental health after a child's diagnosis or hospitalization for a life-threatening illness. In general, avoidant or dissociative coping strategies are generally thought to be positively associated with PTSS (Compas et al., 2012; Daniels et al., 2011; Fuemmeler, 2001; Phipps et al., 2005; Stoppelbein et al., 2013). Active coping strategies, such as planning, have also been previously identified as adaptive when coping with chronic illness and hospitalization (Rao et al., 2004). Social-support users are more externally focused in their coping styles and give greater attention to the importance of others, which has been linked to more positive outcomes for both parents and children (Rini et al., 2008). However, in this study as in another recent report (Stoppelbein et al., 2013), neither active coping strategies, social support nor

the family environment were associated with PTSS. In the current study, negative coping (denial, self-blame and venting) was the only coping strategy with an independent influence on PTSS. Interestingly, the effect of negative coping strategies on PTSS was moderated based on whether they co-occur with anxiety or depression. If confirmed in future studies, this finding suggests that screening and intervention might be best targeted at these specific maladaptive coping strategies as well as on the individual dimensions of hospital-related distress.

The importance of parental distress during and immediately after a child's hospitalization for a life-threatening or life-limiting illness for later psychological outcomes has been well documented, with findings that anxiety and depression are associated with subsequent adjustment difficulties and PTSD (Balluffi et al., 2004;

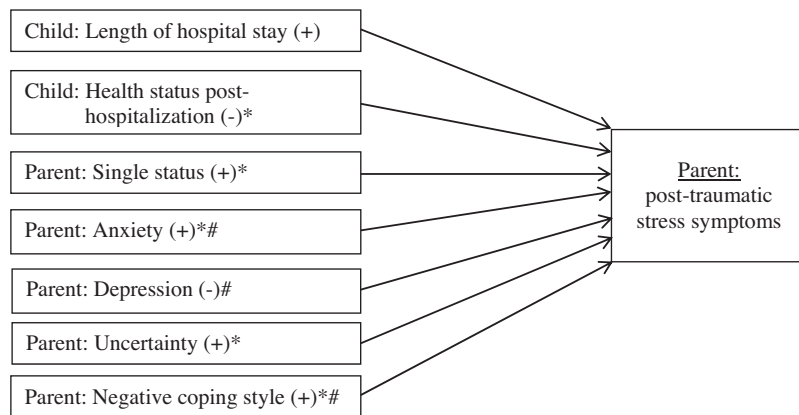


Fig. 3. Final model of post-traumatic stress among parents following child hospitalization. (+) factors are associated with more post-traumatic stress, while (–) factors are associated with less post-traumatic stress. (*) factors significant in the final model. (#) significant two-way interactions: negative coping strategies and anxiety; negative coping strategies and depression.

Table 4Multiple regression analysis of post-traumatic stress symptoms (IES-R) on parent coping strategies and distress during hospitalization ($n = 105$).

Step	Predictors	B	SE B ^a	95% CI	β	p	ΔR^2
1	Relevant covariate					<.001	.217
	Single parent	8.509	3.571	1.418, 15.600	0.188	.019	
	Length of hospital stay (in days)	0.078	0.104	−0.128, 0.285	0.060	.453	
	Child health after discharge ^a	−4.440	1.580	−7.577, −1.304	−0.240	.006	
2	Parent coping strategies					.008	.073
	Negative coping (COPE)	2.763	1.339	0.104, 5.423	0.196	.042	
	Optimism (LOT-R)	0.226	0.263	−0.297, 0.749	0.077	.393	
3	Parent distress during hospitalization					<.001	.124
	Anxiety (HADS)	1.402	0.435	0.538, 2.267	0.343	.002	
	Depression (HADS)	−0.517	0.394	−1.299, 0.265	−0.132	.192	
	Uncertainty (PPUS)	0.212	0.096	0.022, 0.401	0.178	.029	
4	Interactions ^b					.001	.086
	Negative coping X depression	−1.411	0.352	−2.109, −0.713	−0.435	<.001	
	Negative coping X anxiety	0.957	0.353	0.256, 1.659	0.322	.008	
	Full model	$F(10,94) = 9.39, p < .001$					.500 ^c

CI = confidence interval; COPE = BriefCOPE Scale; HADS = Hospital Anxiety and Depression Scale; IES-R = Impact of Events Scale – Revised; LOT-R = Life Orientation Test – Revised; PPUS = Parent Perception of Uncertainty in Illness Scale.

^a Parent's perception of child health three months after discharge.

^b Only significant two-way interactions between included variables were retained in the final model.

^c Adjusted $R^2 = .446$.

Dunn et al., 2012; Helfricht et al., 2008). Although some distress reactions are adaptive (Kazak et al., 2003), the degree of anxiety and depression are not routinely assessed and hospital personnel often do not recognize the high levels of anxiety experienced by parents of children hospitalized for less acute conditions (Needle et al., 2009), nor are they able to recognize when anxiety becomes maladaptive. Our findings strongly suggest that greater awareness by pediatric healthcare providers is warranted. Screening, preventative strategies and psychological intervention for severe anxiety and depression should be tested and made more widely available to parents.

Our findings confirmed the theoretical and empirical link between perceived parental uncertainty during the child's hospitalization and PTSS (Santacroce, 2003). The dimensions of uncertainty most strongly correlated with PTSS are all amenable to intervention by healthcare professionals during the child's hospitalization. For example, parents can be provided with more frequent and higher quality information about treatments and care processes and be more effectively engaged in the planning of their child's care, whatever the length of hospital stay or nature of the child's condition. Family-centered care interventions that improve the regularity and consistency of information provided to parents, enabling greater involvement in decision-making and family-centered care (Davidson et al., 2007; Kuo et al., 2012) should be investigated to determine if they reduce the risk of PTSS. A further consideration is the relationship between parent and child adjustment and the recognition that interventions with parents can also result in improvements in the adjustment of their children (Garraalda et al., 2009; Pakenham and Cox, 2012).

The significant contribution of anxiety, depression and uncertainty during hospitalization identified in this study has important implications for the role of screening to detect at-risk parents and for the implementation of interventions to reduce these sources of distress and

provide follow-up care. Recent research has focused on stepped care models that include trauma-informed health care teams, universal screening and targeted services for those found to be at high risk (Kassam-Adams et al., 2009; Kazak et al., 2003; Winston et al., 2003; Zatzick et al., 2004). Evidence-based interventions with parents of children admitted for short stays on general wards have not yet been reported, nor has the effect of different types of family accommodation or family support provided by the volunteer sector been investigated. Further longitudinal studies are needed to determine if PTSS subscale without intervention or if intervention could shorten the duration and severity of symptoms and positively influence parent and child mental and physical health.

Nurses have a vital role in establishing a supportive relationship between the health care team and the child's family, in implementing preventative interventions for all parents of hospitalized children and in assessing if a parent is exhibiting high levels of distress or maladaptive coping strategies and well as in implementing interventions to reduce these risk factors. However, further research and clinical quality improvement initiatives are needed to identify the most effective techniques for nurses to provide such support and to ensure that all pediatric nurses are educated to perform these essential skills.

The findings from this study should be considered in light of its strengths and limitations. The strengths of the study include the prospective design, broad inclusion criteria and comprehensive array of potential predictors. Limitations include the single site, lack of information on pre-admission PTSS, brief follow-up period and attrition over time. Although the follow-up rate of 43% was somewhat low, the minimal differences between respondents and non-respondents suggest that sample was reasonably representative of the larger population. Nonetheless, replication of these findings in other samples is needed. The FES subscales had low Cronbach's alpha coefficients, and their limited reliability might account for the lack of association between the FES and PTSS. In

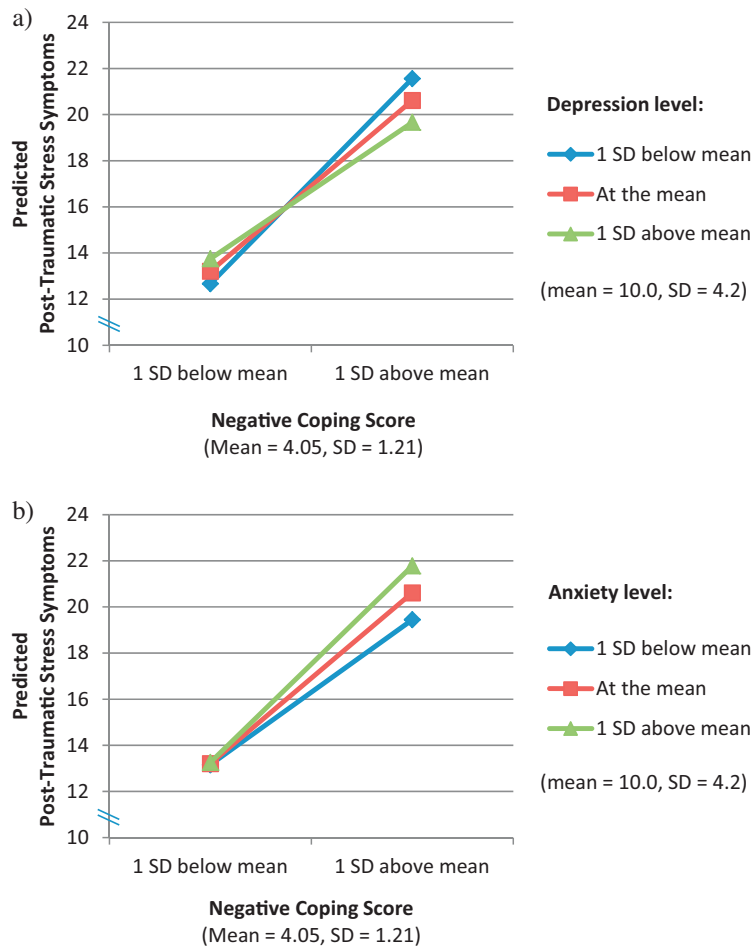


Fig. 4. Parent negative coping style was less strongly associated with post-traumatic stress symptoms in the presence of parent depression during the child's hospitalization (a); parent negative coping style was more strongly associated with post-traumatic stress symptoms in the presence of parent anxiety during the hospitalization (b).

addition, unmeasured factors may also have influenced PTSS, such as parent-child conflict and child PTSD (Hall et al., 2006). Generalizability of the findings is limited to English speaking parents of moderate socioeconomic status. Given that the majority of the children had chronic conditions and prior hospitalizations, future studies might address the role of family characteristics and the level of post-traumatic stress symptoms prior to admission.

In summary, these findings highlight a number of factors associated with parental PTSS three months after a child's hospital discharge. Parents' use of negative coping strategies, hospital-related anxiety, depression and perceived uncertainty about their child's hospital care and treatment are potentially modifiable factors that most strongly influenced PTSS. Screening for and appreciating the impact of these factors may inform nurses and other health care providers to provide support and follow-up care to families at higher risk. Further research is urgently needed to test the immediate and long-term effectiveness of different methods to provide support for parents. Research should not be limited to parents of children in intensive care or with chronic conditions, as this study

suggests that a child's hospitalization presents significant risks to parents' mental health regardless of the child's illness or length of hospital stay.

Conflict of interest

None.

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Ethical approval

The study was approved by UCL Institute of Child Health and Oxford Radcliffe NHS Trust.

References

- Alisic, E., Jongmans, M.J., van Wesel, F., Kleber, R.J., 2011. Building child trauma theory from longitudinal studies: a meta-analysis. *Clin. Psychol. Rev.* 31 (5) 736–747.

- Bakker, A., Van Loey, N.E., Van Son, M.J., Van der Heijden, P.G., 2010. Brief report: mothers' long-term posttraumatic stress symptoms following a burn event of their child. *J. Pediatric Psychol.* 35 (6) 656–661.
- Balluffi, A., Kassam-Adams, N., Kazak, A., Tucker, M., Dominguez, T., Helfaer, M., 2004. Traumatic stress in parents of children admitted to the pediatric intensive care unit. *Pediatric Crit. Care Med.* 5 (6) 547–553.
- Barakat, L.P., Kazak, A.E., Gallagher, P.R., Meeske, K., Stuber, M., 2000. Posttraumatic stress symptoms and stressful life events predict the long-term adjustment of survivors of childhood cancer and their mothers. *J. Clin. Psychol. Med. Settings* 7 (4) 189–196.
- 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 (9) 630–641.
- Bienvenu, O.J., Gellar, J., Althouse, B.M., Colantuoni, E., Sricharoenchai, T., Mendez-Tellez, P.A., Shanholtz, C., Dennison, C.R., Pronovost, P.J., Needham, D.M., 2013. Post-traumatic stress disorder symptoms after acute lung injury: a 2-year prospective longitudinal study. *Psychol. Med.* 43 (12) 2657–2671.
- Bjelland, I., Dahl, A.A., Haug, T.T., Neckelmann, D., 2002. The validity of the hospital anxiety and depression scale. An updated literature review. *J. Psychosom. Res.* 52 (2) 69–77.
- Brewin, C.R., Holmes, E.A., 2003. Psychological theories of posttraumatic stress disorder. *Clin. Psychol. Rev.* 23 (3) 339–376.
- Broadhead, W.E., Gehlbach, S.H., de Gruy, F.V., Kaplan, B.H., 1988. The Duke-UNC Functional Social Support Questionnaire. Measurement of social support in family medicine patients. *Med. Care* 26 (7) 709–723.
- Bronner, M.B., Kayser, A.M., Knoester, H., Bos, A.P., Last, B.F., Grootenhuis, M.A., 2009. A pilot study on peritraumatic dissociation and coping styles as risk factors for posttraumatic stress, anxiety and depression in parents after their child's unexpected admission to a Pediatric Intensive Care Unit. *Child Adolesc. Psychiatry Ment. Health* 3 (1) 33.
- Carver, C.S., 2013. Brief COPE.
- Carver, C.S., 1997. You want to measure coping but your protocol's too long: consider the brief COPE. *Int. J. Behav. Med.* 4 (1) 92–100.
- Colville, G., Darkins, J., Hesketh, J., Bennett, V., Alcock, J., Noyes, J., 2009. The impact on parents of a child's admission to intensive care: integration of qualitative findings from a cross-sectional study. *Intens. Crit. Care Nurs.* 25 (2) 72–79.
- Commodari, E., 2010. Children staying in hospital: a research on psychological stress of caregivers. *Ital. J. Pediatrics* 36, 40.
- Compas, B.E., Jaser, S.S., Dunn, M.J., Rodriguez, E.M., 2012. Coping with chronic illness in childhood and adolescence. *Annu. Rev. Clin. Psychol.* 8, 455–480.
- Daniels, J.K., Hegadoren, K., Coupland, N.J., Rowe, B.H., Neufeld, R.W., Lanis, R.A., 2011. Cognitive distortions in an acutely traumatized sample: an investigation of predictive power and neural correlates. *Psychol. Med.* 41 (10) 2149–2157.
- Davidson, J.E., Jones, C., Bienvenu, O.J., 2012. Family response to critical illness: postintensive care syndrome-family. *Crit. Care Med.* 40 (2) 618–624.
- Davidson, J.E., Powers, K., Hedayat, K.M., Tieszen, M., Kon, A.A., Shepard, E., Spuhler, V., Todres, I.D., Levy, M., Barr, J., Ghandi, R., Hirsch, G., Armstrong, D., 2007. Clinical practice guidelines for support of the family in the patient-centered intensive care unit: American College of Critical Care Medicine Task Force 2004–2005. *Crit. Care Med.* 35 (2) 605–622.
- Dunn, M.J., Rodriguez, E.M., Barnwell, A.S., Grossenbacher, J.C., Vannatta, K., Gerhardt, C.A., Compas, B.E., 2012. Posttraumatic stress symptoms in parents of children with cancer within six months of diagnosis. *Health Psychol.* 31 (2) 176–185.
- Franck, L., Wray, J., Gay, C., Dearnun, A.K., Alsberge, I., Lee, K.A., 2014. Where do parents sleep best when children are hospitalized? A pilot comparison study. *Behav. Sleep Med.* 12 (4) 307–316.
- Franck, L.S., McQuillan, A., Wray, J., Grocott, M.P., Goldman, A., 2010. Parent stress levels during children's hospital recovery after congenital heart surgery. *Pediatric Cardiol.* 31 (7) 961–968.
- Fuemmeler, B.F., 2001. Posttraumatic stress and general distress among parents of children surviving a brain tumor. *Children's Health Care* 30 (3) 169–182.
- Garraida, M.E., Gledhill, J., Nadel, S., Neasham, D., O'Connor, M., Shears, D., 2009. Longer-term psychiatric adjustment of children and parents after meningococcal disease. *Pediatric Crit. Care Med.* 10 (6) 675–680.
- Hall, E., Saxe, G., Stoddard, F., Kaplow, J., Koenen, K., Chawla, N., Lopez, C., King, L., King, D., 2006. Posttraumatic stress symptoms in parents of children with acute burns. *J. Pediatric Psychol.* 31 (4) 403–412.
- Helfrich, S., Latal, B., Fischer, J.E., Tomaske, M., Landolt, M.A., 2008. Surgery-related posttraumatic stress disorder in parents of children undergoing cardiopulmonary bypass surgery: a prospective cohort study. *Pediatric Crit. Care Med.* 9 (2) 217–223.
- Hoekstra-Weebers, J.E., Wijnberg-Williams, B.J., Jaspers, J.P., Kamps, W.A., Wiel, H.B., 2012. Coping and its effect on psychological distress of parents of pediatric cancer patients: a longitudinal prospective study. *Psycho-Oncology* 21 (8) 903–911.
- Horsch, A., McManus, F., Kennedy, P., Edge, J., 2007. Anxiety, depressive, and posttraumatic stress symptoms in mothers of children with type 1 diabetes. *J. Traum. Stress* 20 (5) 881–891.
- Kassam-Adams, N., Fleisher, C.L., Winston, F.K., 2009. Acute stress disorder and posttraumatic stress disorder in parents of injured children. *J. Traum. Stress* 22 (4) 294–302.
- Kazak, A.E., Cant, M.C., Jensen, M.M., McSherry, M., Rourke, M.T., Hwang, W.T., Alderfer, M.A., Beele, D., Simms, S., Lange, B.J., 2003. Identifying psychosocial risk indicative of subsequent resource use in families of newly diagnosed pediatric oncology patients. *J. Clin. Oncol.* 21 (17) 3220–3225.
- Kuo, D.Z., Houtrow, A.J., Arango, P., Kuhlthau, K.A., Simmons, J.M., Neff, J.M., 2012. Family-centered care: current applications and future directions in pediatric health care. *Maternal Child Health J.* 16 (2) 297–305.
- 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. *J. Child Psychol. Psychiatry* 44 (8) 1199–1207.
- Mishel, M.H., 1983. Parents' perception of uncertainty concerning their hospitalized child. *Nurs. Res.* 32 (6) 324–330.
- Mishel, M.H., 1997. Uncertainty in Illness Scales Manual. University of North Carolina, Chapel Hill.
- Moos, R.H., 1990. Conceptual and empirical approaches to developing family-based assessment procedures: resolving the case of the Family Environment Scale. *Family Process* 29 (2) 199–208 (discussion 209–111).
- Moos, R.H., Moos, B.S., 1994. Family Environment Scale Manual: Development, Applications, Research. Consulting Psychologists Press, Palo Alto, Calif.
- Nabors, L.A., Kichler, J.C., Brassell, A., Thakkar, S., Bartz, J., Pangallo, J., Van Wassenhove, B., Lundy, H., 2013. Factors related to caregiver state anxiety and coping with a child's chronic illness. *Family Syst. Health* 31 (2) 171–180.
- National Health Service (England), 2013. Children in Hospital.
- Needham, D.M., Davidson, J., Cohen, H., Hopkins, R.O., Weinert, C., Wunsch, H., Zawistowski, C., Bemis-Dougherty, A., Berney, S.C., Bienvenu, O.J., Brady, S.L., Brodsky, M.B., Denehy, L., Elliott, D., Flatley, C., Harabin, A.L., Jones, C., Louis, D., Meltzer, W., Muldoon, S.R., Palmer, J.B., Perme, C., Robinson, M., Schmidt, D.M., Scruth, E., Spill, G.R., Storey, C.P., Render, M., Votto, J., Harvey, M.A., 2012. Improving long-term outcomes after discharge from intensive care unit: report from a stakeholders' conference. *Crit. Care Med.* 40 (2) 502–509.
- Needle, J.S., O'Riordan, M., Smith, P.G., 2009. Parental anxiety and medical comprehension within 24 hrs of a child's admission to the pediatric intensive care unit. *Pediatric Crit. Care Med.* 10 (6) 668–674 (quiz 674).
- Nugent, N.R., Ostrowski, S., Christopher, N.C., Delahanty, D.L., 2007. Parental posttraumatic stress symptoms as a moderator of child's acute biological response and subsequent posttraumatic stress symptoms in pediatric injury patients. *J. Pediatric Psychol.* 32 (3) 309–318.
- Pakenham, K.I., Cox, S., 2012. Test of a model of the effects of parental illness on youth and family functioning. *Health Psychol.* 31 (5) 580–590.
- Phipps, S., Dunavant, M., Lensing, S., Rai, S.N., 2005. Psychosocial predictors of distress in parents of children undergoing stem cell or bone marrow transplantation. *J. Pediatric Psychol.* 30 (2) 139–153.
- Power, N., Franck, L., 2008. Parent participation in the care of hospitalized children: a systematic review. *J. Adv. Nurs.* 62 (6) 622–641.
- Rao, P., Pradhan, P.V., Shah, H., 2004. Psychopathology and coping in parents of chronically ill children. *Indian J. Pediatrics* 71 (8) 695–699.
- Rash, C.J., Coffey, S.F., Baschnagel, J.S., Drobos, D.J., Saladin, M.E., 2008. Psychometric properties of the IES-R in traumatized substance dependent individuals with and without PTSD. *Addict. Behav.* 33 (8) 1039–1047.
- Rees, G., Gledhill, J., Garraida, M.E., Nadel, S., 2004. Psychiatric outcome following paediatric intensive care unit (PICU) admission: a cohort study. *Intens. Care Med.* 30 (8) 1607–1614.
- Rini, C., Manne, S., DuHamel, K., Austin, J., Ostroff, J., Boulad, F., Parsons, S.K., Martini, R., Williams, S.E., Mee, L., Sexson, S., Redd, W.H., 2008. Social support from family and friends as a buffer of low spousal support among mothers of critically ill children: a multilevel modeling approach. *Health Psychol.* 27 (5) 593–603.

- Santacroce, S.J., 2003. Parental uncertainty and posttraumatic stress in serious childhood illness. *J. Nurs. Scholar.* 35 (1) 45–51.
- Scheier, M.F., Carver, C.S., Bridges, M.W., 1994. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *J. Personal. Social Psychol.* 67 (6) 1063–1078.
- Shaw, R.J., Bernard, R.S., Deblois, T., Ikuta, L.M., Ginzburg, K., Koopman, C., 2009. The relationship between acute stress disorder and posttraumatic stress disorder in the neonatal intensive care unit. *Psychosomatics* 50 (2) 131–137.
- Stoppelbein, L., Greening, L., Wells, H., 2013. Parental coping and post-traumatic stress symptoms among pediatric cancer populations: tests of competing models. *Psycho-Oncology* 22 (12) 2815–2822.
- Sundin, E.C., Horowitz, M.J., 2002. Impact of event scale: psychometric properties. *Br. J. Psychiatry* 180, 205–209.
- U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2012. *Summary Health Statistics for the U.S. population: National Health Interview Survey 2011.*
- Weiss, D.S., 2004. The impact of event scale-revised. In: Wilson, J.P., Keane, T.M. (Eds.), *Assessing Psychological Trauma and PTSD: A Practitioner's Handbook*. Guilford Press, New York, pp. 168–189.
- Weiss, D.S., Marmar, C.R., 1997. The impact of event scale-revised. In: Wilson, J.P., Keane, T.M. (Eds.), *Assessing Psychological Trauma and PTSD: A Practitioner's Handbook*. Guilford Press, New York, pp. 399–411.
- 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. *J. Am. Med. Assoc.* 290 (5) 643–649.
- Wray, J., Lee, K., Dearmun, N., Franck, L., 2011. Parental anxiety and stress during children's hospitalisation: the StayClose study. *J Child Health Care* 15 (3) 163–174.
- Yantzi, N., Rosenberg, M.W., Burke, S.O., Harrison, M.B., 2001. The impacts of distance to hospital on families with a child with a chronic condition. *Social Sci. Med.* 52 (12) 1777–1791.
- Zatzick, D., Jurkovich, G., Russo, J., Roy-Byrne, P., Katon, W., Wagner, A., Dunn, C., Uehara, E., Wisner, D., Rivara, F., 2004. Posttraumatic distress, alcohol disorders, and recurrent trauma across level 1 trauma centers. *J. Trauma* 57 (2) 360–366.
- Zigmond, A.S., Snaith, R.P., 1983. The hospital anxiety and depression scale. *Acta Psychiatr. Scand.* 67 (6) 361–370.