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Parental Coping in the Neonatal Intensive Care Unit

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Abstract

Fifty-six mothers of premature infants who participated in a study to reduce symptoms of posttraumatic stress disorder (PTSD) completed the Brief COPE, a self-report inventory of coping mechanisms, the Stanford Acute Stress Reaction Questionnaire to assess acute stress (ASD) disorder and the Davidson Trauma Scale (DTS) to assess PTSD. 18% of mothers had baseline ASD while 30% of mothers met the criteria for PTSD at the one-month follow-up. Dysfunctional coping as measured by the Brief COPE was positively associated with elevated risk of PTSD in these mothers (RR = 1.09, 95% CI: 1.02, 1.15; $p=.008$). Maternal education was positively associated with PTSD; each year increase in education was associated with a 17% increase in the relative risk of PTSD at one month follow-up (RR = 1.17, 95% CI: 1.02, 1.35; $p=.03$). Results suggest that dysfunctional coping is an important issue to consider in the development of PTSD in parents of premature infants.

Keywords

PTSD; Neonatal Intensive Care Unit; Coping

It is well established that the birth and hospitalization of a preterm infant is a stressful experience for parents. Research has demonstrated the presence of emotional distress in parents, particularly in mothers, including symptoms of anxiety, depression, sleep disruption, and more recently, posttraumatic stress disorder (PTSD) (Holditch-Davis et al. 2003; Pierrehumbert et al. 2003). Studies of parents of premature infants hospitalized in the neonatal intensive care unit (NICU) have demonstrated the onset of parental distress including acute stress disorder (ASD) very early in their infant's hospital stay (Lefkowitz et al., 2010; Shaw et al., 2006). It has also been noted that parental ASD is strongly associated with the later development of PTSD (Lefkowitz et al., 2010; Shaw et al. 2009). Other research has documented PTSD in NICU parents with a prevalence rate of up to 41% as long as fourteen months after their infant's birth (Kersting et al. 2004). Risk factors associated with posttraumatic stress following childbirth include a history of psychological

problems, trait anxiety, obstetric procedures, negative aspects in staff-mother contact, feelings of loss of control over the situation, and lack of partner support (Olde et al., 2005).

Most reports of parental stress during pediatric ICU admissions indicate that symptoms of anxiety are initially elevated but subsequently decline and stabilize over time (Needle et al. 2009). Acute phase reactions include shock, helplessness and feelings of inadequacy and guilt. Parents often utilize coping styles to avoid becoming overwhelmed by perceived or actual threats to their child and their feelings of own competence as a parent. Coping behaviors can be both adaptive such as mobilizing social support and non-adaptive including anger directed toward hospital staff and alcohol and substance abuse use. Studies have shown that parental coping styles characterized by avoidance and passive reaction strategies tend to be associated with a greater prevalence of mental health problems including anxiety, depression, and PTSD (Colville et al. 2006; Rees et al. 2007).

Much of the early work on coping been based on the transactional model of stress and coping proposed and assessed using the Ways of Coping Questionnaire developed by Folkman and Lazarus (1998). In this model it is postulated that the expression of emotions allows individuals to release psychological stress while techniques of cognitive restructuring may allow individuals to reframe their cognitions to reduce their perceptions of threat. However, data on coping in NICU parents and its relationship with adaptation is limited and conclusions not well established. Pinelli (2000), for example, in a sample of 124 parents found that family coping was generally not strongly related to either family adjustment or parental anxiety although reframing was associated with lower anxiety and positive coping did include the use of social support. By contrast, Shaw and colleagues (2006) reported that parents of NICU infants classified as suppressors and those using restraint were more likely to manifest trauma symptoms in contrast to those with a reactive coping style and suggested that the ability to recognize and express emotional distress may promote adaptation. There is more data on coping in parents of pediatric cancer patients. Greening & Stoppelbein (2007) reported that avoidant coping was associated with increased rates of PTSD in parents while Grootenhuis and Last (1997) reported positive psychological outcomes associated with an open style of communication and optimism while negative outcomes appear to be associated with disengagement. It has been suggested that coping strategies that focus on managing emotions and the appraisal of the stress may be more adaptive than problem-focused coping in a medical situation where events are less under the control of parents (Baskin et al., 1985; Felton & Revenson, 1984). For example, mothers of children receiving bone marrow transplants were more likely to have symptoms of depression after transplant if they resorted to either active, problem-focused or avoidant coping in contrast to those mothers who used a coping style that facilitated emotional regulation (Manne et al., 2003).

In the current study, we examine parental coping styles in a sample of women whose infants were hospitalized in a NICU. Although there have been numerous studies that have examined the issue of parental coping in NICU parents, there have been relatively few studies that have examined the association between coping mechanisms and PTSD in this population. Consistent with previous research (Baluffi et al. 2004; Shaw et al. 2009), we hypothesize: [1] that the early onset of symptoms of ASD will be associated with PTSD one month after their infant's birth. Further, consistent with previous research on the relationship between parental coping and emotional adjustment, we hypothesize: [2] that maladaptive coping strategies assessed using the Brief COPE (Behavioral Disengagement, Denial, Self-distraction, and Self-blame, Substance Use, Venting) will be associated with higher rates of PTSD at one month follow up.

METHOD

Participants

This study was approved by the institutional review board of the Stanford University School of Medicine. Parents of premature infants hospitalized in the Lucile Packard Children's Hospital (LPCH) NICU were asked to participate in a study examining the effectiveness of an intervention to decrease parental anxiety. Details about the sample and the intervention have been previously reported (Bernard et al., 2011). Inclusion criteria were: (1) 18 years of age or older; (2) participants spoke either English or Spanish; (3) the participant's infant was expected to survive; (4) the infant's weight was over 1,000 grams and the infant was less than 37 weeks gestation; (5) the participant's infant was born at or transferred to LPCH within 72 hours.

Of the 56 mothers who participated in this study, 50 had follow-up data on PTSD at the one-month outcome. Mothers were 32.7 years of age on average ($SD = 4.9$ years), 94% were married or living with a partner, and 58% reported an annual pre-tax household income of at least \$100,000. Half of the mothers reported that the infant in this study was their first child. Just over half of the mothers were Caucasian (56%), while 20% were Hispanic, 20% were Asian, and the remaining 4% were of other race/ethnicities. One-fourth (26%) of mothers reported having a graduate or professional degree, and an additional 52% reported having a college degree; only 6% of mothers reported that they did not complete high school. In this sample, there was an association between race/ethnicity and education; 80% of Hispanic mothers did not have education beyond high school compared to 4% of Caucasian and 10% of Asian mothers ($p < .001$). The mean gestational age and birth weight of the infants were 31.9 weeks ($SD = 2.7$) and 1757 grams ($SD = 571$), respectively. The median length of the infant's hospital stay was 41 days (IQR: 27, 59).

Measures

The *Stanford Acute Stress Reaction Questionnaire* (Classen et al. 1998; Koopman et al. 1994) (SASRQ) was used to assess ASD symptoms. The SASRQ is a 30-item self-report questionnaire assessing the frequency (rated on a 1 to 5 scale) that respondents experienced each ASD symptom during or after having an infant in the NICU. When compared with measures of PTSD, the SASRQ has been found to have excellent reliability and convergent validity with measures of adult PTSD (Koopman et al., 1994). Cronbach's alpha with this sample is .92.

The *Davidson Trauma Scale* (DTS) (Davidson et al. 1997) was administered at the one-month follow-up. The DTS is a 17-item self-report questionnaire that assesses symptoms of PTSD. The DTS has demonstrated good test-retest reliability, internal consistency, and construct validity. Cronbach's alpha with this sample is .93. Consistent with recommendations by the author of the DTS, (Davidson et al., 1997), mothers were categorized as having PTSD at the one month follow-up assessment if their DTS score was 40 or higher.

The *Brief COPE* (Carver 1987; Carver et al. 1989) was used to assess parental strategies for coping with stressors associated with having an infant in the NICU. Carver and colleagues developed the COPE as a flexible multidimensional coping style inventory for a broad range of applications in applied psychology. In the Brief COPE, 28 items are presented in the form of a coping statement and respondents are asked to rate whether they have or have not been using each way of coping on a fully anchored four-point scale ranging from '1=I haven't been doing this at all' to '4=I've been doing this a lot'. The Brief COPE has 14 subscales representing a broad range of coping strategies. Using the methodology described by Cooper et al. (2008), two adaptive coping scales (emotion-focused and problem-focused) and one

maladaptive coping scale (dysfunctional) were created. The theoretical range is 10–40 points for the emotional-focused coping scale, 6–24 points for the problem-focused coping scale, and 12–48 points for the dysfunctional coping scale. Internal consistency reliability (Cronbach's alpha) for this sample for the emotional focused, problem-focused and dysfunctional coping scales were 0.68, 0.84 and 0.76, respectively.

Design

The women examined in these analyses were part of a treatment intervention study for parents of NICU infants that has been previously described (Bernard et al., 2011). This study, which utilized a longitudinal design, investigated the effectiveness of a three-session intervention that incorporated principles of trauma-focused cognitive behavior therapy designed to reduce symptoms of PTSD (Foa et al., 1995; Bison & Andrew, 2007). Mothers completed outcome measures to assess PTSD (Davidson Trauma Scale), depression (Beck Depression Inventory-II [BDI-II]; Beck et al. 1996) and anxiety (State-Trait Anxiety Inventory [STAI]; Spielberger, 1983) in NICU parents. Mothers participated in three individual therapy session each 45 minutes in duration and scheduled over a two week time period starting one to two weeks after the birth of their infant. Subjects completed self-report questionnaires at two time points: initially 7–10 days following the hospitalization of their infant (SASRQ, sociodemographic variables, Brief COPE) and again one-month after their infant was discharged from the hospital (DTS; BDI-II, STAI).

Statistical Analyses

Means and standard deviations were used to summarize continuous variables while counts and proportions were used to summarize categorical measures. Unadjusted bivariate associations were examined using Chi-square and Fisher's exact tests, Pearson correlations, two sample T-tests, and Analysis of Variance (ANOVA). To estimate the relative risk of PTSD at one-month follow-up, log-binomial models were fitted; however, these models failed to converge. Thus, "modified Poisson" regression models with a log-link function and robust variance estimates were used to estimate the relative risk of PTSD at one-month follow-up (Spiegelman & Hertzmark, 2005); relative risk ratios (RR) and their 95% CI are reported. Regression models were adjusted for maternal education as a confounder given its significant bivariate association with coping styles and PTSD at one-month follow-up. Two-sided p -values $< .05$ were considered to be statistically significant, and no adjustments were made for multiple comparisons. SAS version 9.2 (SAS Institute Inc., Cary, NC) was used for data analysis.

RESULTS

Education was positively associated with all three coping scales; correlations were $r = 0.29$ ($p < .05$) for the dysfunctional coping scale, $r = .34$ ($p < .05$), for the emotion-focused coping scale and $r = .37$ ($p < .01$) for the problem-focused coping scale. Maternal age was not associated with coping styles, with correlations ranging from $r = -.03$ for the problem-focused coping scale to $r = -.19$ for the emotion-focused coping scale. Consistent with previous findings (Cooper, 2008), the emotion-focused, problem-focused and dysfunctional coping scales were moderately positively correlated, ranging from $r = .41$ for problem-focused and dysfunctional coping scales to $r = .57$ for emotion-focused and problem-focused coping scales; the correlation between the emotion-focused and dysfunctional coping scales was $r = .42$.

Bivariate associations of race/ethnicity, marital status, household income, and first child are displayed in Table 1. ANOVA indicated that race/ethnicity was significantly associated with each coping scale; post-hoc pairwise comparisons showed that Hispanic mothers had

significantly lower scores on each of the three scales compared to Caucasian or Asian mothers (p -values $< .05$). On average, mothers who were married/partnered had higher scores on all three coping scales compared to mothers who were single, separated or divorced; however, these differences did not reach statistical significance due to the small number of mothers in the latter group ($n = 3$). Household income and first child was not associated with the coping scales.

Overall, nearly one-fifth (18%) of mothers met criteria for ASD based on self-report at baseline while 30% ($n = 15$) of mothers met the criteria for PTSD at one-month follow-up (DTS score ≥ 40). Mothers with baseline ASD had significantly elevated risk of PTSD at one-month follow-up. Of the $n=9$ mothers with baseline ASD, $n=6$ (66.7%) had PTSD at one-month follow-up, while $n=9$ of the $n=41$ (22.0%) mothers without baseline ASD had PTSD at one-month follow-up (RR = 3.04, 95% CI: 1.45, 6.36; $p = .003$). Bivariate analyses also showed that education was positively associated with PTSD (see Table 2). Mothers with PTSD at one-month follow-up had significantly more years of education than mothers who did not have PTSD at one-month follow-up (17.4 ± 3.0 vs. 15.2 ± 2.6 years, $p = .02$). Maternal age, race/ethnicity, marital status, household income, and first child were not significantly associated with PTSD at the one-month follow-up. Baseline scores on the dysfunctional coping scale and the problem-focused coping scale were significantly higher on average for mothers with PTSD at one-month follow-up compared to mothers without PTSD at one-month follow-up. Scores on the emotional-coping scale were similar for mothers with and without PTSD at one-month follow-up.

The dysfunctional coping scale was positively associated with elevated risk of PTSD at the one-month follow-up. The relative risk of PTSD at one-month follow-up increased by 9% for each one-point increase on the dysfunctional coping scale (RR = 1.09, 95% CI: 1.02, 1.15; $p = .008$) after adjusting for maternal education and treatment group (intervention vs. control) (Table 3). Maternal education was also positively associated with the relative risk of PTSD; each year increase in education was associated with a 17% increase in the relative risk of PTSD at one month follow-up (RR = 1.17, 95% CI: 1.02, 1.35; $p = .03$). The emotion-focused and problem-focused coping scales were not associated with PTSD at one-month follow-up in analyses adjusted for education and treatment group. The intervention was not significantly associated with the relative risk of PTSD at one month follow-up.

Sensitivity Analyses

Sensitivity analyses were used to ensure that participation in the intervention did not have an appreciable impact on the estimated associations with PTSD at one-month follow-up. First, we examined the two-way interaction between treatment group (intervention and control groups) and each coping style. Second, due to a lack of statistical power to detect significant interactions with the treatment group, the consistency of the associations for the intervention and control groups were examined in analyses stratified by treatment group. The two-way interactions were not statistically significant, and the results of the stratified analyses were consistent with the primary findings (results not shown).

DISCUSSION

Posttraumatic stress following childbirth, even in the absence of prematurity, has been well documented in the literature with prevalence estimates between 1.7–5.6% (Tedstone & Tarrier, 2003) although prevalence rates for posttraumatic stress symptoms not meeting criteria for PTSD are as high as 33% (Olde et al., 2005). Data suggest that rates of PTSD may be even higher in mothers of premature infants with research documenting prevalence rates as high as 41% (Holditch-Davis et al., 2003; Kersting et al., 2004; Pierrehumbert et al., 2003). Data from our sample of mothers of premature infants hospitalized in the NICU

support our first hypothesis and show that 18% of mothers had baseline ASD as measured by the SASRQ while 30% of mothers met the criteria for PTSD as assessed by the DTS at one-month follow-up. This finding is consistent with results from previous studies of PTSD in parents of premature infants (Kersting et al., 2004; Lefkowitz et al., 2010; Shaw et al., 2009) as well as data from parents of children with cancer (Kazak et al., 2004). However, although meta-analyses of studies on the relationship do show a consistent relationship between ASD and the later development of PTSD (Bryant, 2011) – at least half of trauma survivors with ASD subsequently meet criteria for PTSD – the sensitivity across studies is poor. Bryant (2011) reported that the majority of trauma survivors who eventually developed PTSD did not meet the full criteria for ASD. However, if data include individuals with subsyndromal ASD, specifically dropping the dissociative cluster symptoms, sensitivity is improved. In our data set, 44% of mothers without baseline ASD who had PTSD at follow-up met the 3 out of the 4 criteria for ASD at baseline. Nonetheless, although ASD may be a useful predictor of PTSD, it cannot be relied upon to predict all cases of PTSD.

Establishing a relationship between maternal coping and PTSD is potentially important because coping is thought to be amenable to treatment interventions. Thus, if coping is related to PTSD and can be successfully changed, then some portion of the cases of PTSD might be prevented. The principal finding in this study with respect to maternal coping is that dysfunctional coping strategies as assessed by the Brief COPE are associated with higher rates of PTSD in mothers of premature infants one month after their infants' birth. Thus, our second hypothesis was supported. This is consistent with data from other studies that have used the Brief COPE to assess the relationship of coping with PTSD. Olley and colleagues (2005), for example, found that use of alcohol as a way of coping was associated with higher rates of PTSD in patients recently diagnosed with AIDS or HIV.

Coping behaviors can be both adaptive, such as mobilizing social support, and maladaptive including anger directed toward hospital staff and alcohol and substance abuse. Our findings are consistent with studies that have shown that parental coping styles characterized by avoidance and passive reaction strategies tend to be associated with a greater prevalence of mental health problems including anxiety and depression. For example, studies of parents of premature infants have also shown a relationship between escape-avoidant coping and increased maternal distress both at the time of discharge from the hospital, and at long term follow up, particularly if their infants have developmental disabilities (Affleck et al. 1991; Reichman et al., 2000). Similarly, Bronner et al. (2009) reported that peritraumatic dissociation, the state of limited or distorted awareness noted immediately after a stressful event, and avoidance coping were associated with PTSD in a study of Dutch parents three months after their child's admission to the ICU. By contrast, problem-focused coping has been associated with improved psychological outcomes in NICU parents when compared with both emotion- and appraisal-focused coping (Young Seideman et al., 1997).

A finding not anticipated in our hypotheses was that mothers with more years of education were more likely to use problem-focused coping as assessed by the Brief COPE, and that mothers with more years of education were significantly more likely to have PTSD at one month follow up. This is consistent with previous studies that have examined the relationship between coping and educational level. Dasch and colleagues (2011) found that parents of youth with spinal injury who also had some college education were less likely to use denial as a coping strategy while Liu and colleagues (2007) noted that education was associated with "active forms of coping" in parents of children with psychiatric illness. However, the finding of the relationship with PTSD is contrary to data from combat-related PTSD and meta-analyses in which lack of education or lower levels of education and lower IQ have been found to be risk factors for PTSD (Brewin et al., 2000; Ozer et al., 2003; Watson et al., 1998; Zohar et al., 2009). In addition, Davis et al. (2003) in a sample of 62

mothers with preterm infants noted that higher levels of maternal education were associated with a decreased likelihood of depressive symptoms assessed using the Edinburgh Postpartum Depression Scale.

One possible explanation for the findings in our sample may be aspects of the trauma that are specific to the NICU situation. As noted above, the “goodness of fit” model of coping suggests that problem-focused coping is thought to be to be less adaptive in the medical setting where events are not usually under the control of the parent (Felton & Revenson, 1984). In our study, problem-focused coping was found to be more common in women with a greater number of years of education. It is possible that highly educated women may, through their life experiences, have found problem-focused coping to be an effective strategy and have habituated to this approach. However, the relative failure of this approach in the NICU setting where very little is under the mother’s control may be particularly stressful in those individuals who have less ability to resort to emotion-focused coping and, as a result, produce poor psychological outcomes.

Another issue is the mother’s view of the potential implications of the birth of a premature infant. Studies have consistently supported the finding that it is the appraisal of the traumatic medical event that is more strongly associated with the development of PTSD rather than the actual medical variables (Tedstone & Tarrier, 2003). Jones et al. (2009) reported that post-discharge psychological distress in parents of premature infants was most strongly related to the appraisal of their situation as challenging. Shaw et al. (2006), for example, found no relationship between maternal PTSD in the NICU and any of the recorded medical variables including birth weight, Apgar scores or length of stay. Given the current findings on educational level, it may be that highly educated mothers may not only have greater knowledge about developmental issues related to prematurity, but also place greater weight on future academic aspirations for their children. As a result these women have a more negative appraisal of the personal implications for their children.

Limitations of the study include reliance on self-report measures to assess coping and PTSD. With respect to coping, the Brief COPE specifically has not been validated in a NICU parent population. We also did not have sufficient power to do a factor analysis to determine the higher order factor scales, something recommended in the original description of the scale (Carver, 1997). However, there are data from several existing factor analyses that can be used to guide use of the measure which were used in the current study (Cooper et al., 2008; Amoval et al., 2011; Snell et al., 2011). There is also the possibility that the intervention may have mediated or confounded the association between coping styles and PTSD. However, our analysis showed no interaction between intervention and PTSD and coping styles were measured at baseline prior to the onset of the intervention. In addition, if coping is hypothesized to be more of a trait rather than a state variable, one would not expect the intervention to influence coping style.

While preliminary in nature, the findings from this study suggest possible implications for clinical care. First, the finding of a relationship between coping and PTSD sheds some light on mediating factors that are potentially amenable to treatment. Cognitive behavioral interventions that target maladaptive cognitions and coping strategies have the potential to influence the development of trauma symptoms in the NICU situation. Second, the finding that maternal education may in fact be a risk factor for the development of PTSD is somewhat contrary to data from other populations, but raises the possibility that the NICU may raise particular issues for groups not conventionally seen to be at increased risk for PTSD. Future intervention studies should incorporate an assessment of coping style to further explore these issues.

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References

- Amoyal NR, Mason ST, Gould NF, Corry N, Mahfouz S, Barkey A, Fauerbach JA. Measuring coping behavior in patients with major burn injuries: a psychometric evaluation of the BCOPE. *Journal of Burn Care Research*. 2011; 32:392–398. [PubMed: 21562462]
- Balluffi A, Kassam-Adams N, Kazak A, Tucker M, Dominguez T, Helfaer M. Traumatic stress in parents of children admitted to the pediatric intensive care unit. *Pediatric Critical Care Medicine*. 2004; 5:547–553. [PubMed: 15530191]
- Baskin CH, Forehand R, Saylor C. Predictors of psychological adjustment in mothers of children with cancer. *Journal of Psychosocial Oncology*. 1985; 3:43–54.
- Beck, AT.; Steer, RA.; Brown, GK. *Beck Depression Inventory-Second Edition*. San Antonio, TX: The Psychological Corporation, Harcourt Brace & Company; 1996.
- Bernard RS, Williams SE, Storfer-Isser A, Rhine W, Horwitz SM, Koopman C, Shaw RJ. Brief cognitive-behavioral intervention for maternal depression and trauma in the neonatal intensive care unit: a pilot study. *Journal of Traumatic Stress*. 2011; 24:230–234. [PubMed: 21438016]
- Bisson J, Andrew M. Psychological treatment of post-traumatic stress disorder (PTSD). *Cochrane Database of Systemic Reviews*. 2007; 3:CD003388.
- Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*. 2000; 68:748–766. [PubMed: 11068961]
- Bronner MB, Kayser AM, Knoester H, Bos AP, Last BF, Grootenhuys MA. 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 and Adolescent Psychiatry and Mental Health*. 2009; 3:33. [PubMed: 19832987]
- Bryant RA. Acute stress disorder as a predictor of posttraumatic stress disorder: a systematic review. *Journal of Clinical Psychiatry*. 2011; 72:233–239. [PubMed: 21208593]
- Carver CS. You want to measure coping but your protocol's too long: consider the Brief COPE. *International Journal of Behavioral Medicine*. 1997; 4:92–100. [PubMed: 16250744]
- Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *Journal of Personality and Social Psychology*. 1989; 56:267–283. [PubMed: 2926629]
- Cooper C, Katona C, Livingston G. Validity and reliability of the brief COPE in carers of people with dementia: the LASER-AD Study. *The Journal of Nervous and Mental Disease*. 2008; 196:838–843. [PubMed: 19008735]
- Classen C, Koopman C, Hales R, Spiegel D. Acute stress disorder as a predictor of posttraumatic stress symptoms. *American Journal of Psychiatry*. 1998; 155:620–624. [PubMed: 9585712]
- Dasch KB, Russell HF, Kelly EH, Gorzkowski JA, Mulcahey MJ, Betz RR, Vogel LC. Coping in caregivers of youth with spinal cord injury. *Journal of Clinical Psychology in Medical Settings*. 2011 Aug 23.2011 [Epub ahead of print].
- Davidson JR, Book SW, Colket JT, Tupler LA, Roth S, David D, Hertzberg M, Mellman T, Beckham JC, Smith RD, Davison RM, Katz R, Feldman ME. Assessment of a new self-rating scale for posttraumatic stress disorder. *Psychological Medicine*. 1997; 27:153–160. [PubMed: 9122295]
- Davis L, Edwards H, Mohay H, Wollin J. The impact of very premature birth on the psychological health of mothers. *Early Human Development*. 2003; 73:61–70. [PubMed: 12932894]
- Felton BJ, Revenson TA. Coping with chronic illness: a study of illness controllability and the influence of coping strategies on psychological adjustment. *Journal of Consulting and Clinical Psychology*. 1984; 52:343–353. [PubMed: 6747054]
- Foa EB, Hearst-Iked D, Perry KJ. Evaluation of a brief cognitive-behavioral program for the prevention of chronic PTSD in recent assault victims. *Journal of Consulting and Clinical Psychology*. 1995; 63:948–955. [PubMed: 8543717]

- Folkman, S.; Lazarus, RS. Research Edition. Palo Alto, CA: Consulting Psychologists Press; 1988. Manual for the Ways of Coping Questionnaire.
- Greening L, Stoppelbein L. Brief report: pediatric cancer, parental coping style, and risk for depressive, posttraumatic stress, and anxiety symptoms. *Journal of Pediatric Psychology*. 2007; 32:1272–1277. [PubMed: 17675304]
- Grootenhuis MA, Last BF. Adjustment and coping by parents of children with cancer: a review of the literature. *Supportive Care in Cancer*. 1997; 5:466–84. [PubMed: 9406361]
- Holditch-Davis D, Bartlett TR, Blickman AL, Miles MS. Posttraumatic stress symptoms in mothers of premature infants. *Journal of Obstetric, Gynecological and Neonatal Nursing*. 2003; 32:161–171.
- Jones L, Rowe J, Becker T. Appraisal, Coping, and Social Support as Predictors of Psychological Distress and Parenting Efficacy in Parents of Premature Infants. *Children's Health Care*. 2009; 38:245–262.
- Kazak A, Stuber ML, Barakat LP, Meeske K, Guthrie D, Meadows AT. Predicting posttraumatic stress symptoms in mothers and fathers of survivors of childhood cancers. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2004; 37:823–831. [PubMed: 9695444]
- Kersting A, Dorsch M, Wesselmann U, Lüdorff K, Witthaut J, Ohrmann P, Hörnig-Franz I, Klockenbusch W, Harms E, Arolt V. Maternal posttraumatic stress response after the birth of a very low-birth-weight infant. *Journal of Psychosomatic Research*. 2004; 57:473–476. [PubMed: 15581651]
- Koopman C, Classen C, Spiegel D. Predictors of posttraumatic stress symptoms among survivors of the Oakland/Berkeley, California firestorm. *American Journal of Psychiatry*. 1994; 151:888–894. [PubMed: 8184999]
- Lefkowitz DS, Baxt C, Evans JR. 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*. 2010; 17:230–237. [PubMed: 20632076]
- Liu M, Lambert CE, Lambert VA. Caregiver burden and coping patterns of Chinese parents of a child with mental illness. *International Journal of Mental Health Nursing*. 2007; 16:86–95. [PubMed: 17348959]
- Manne S, DuHamel K, Stroll J, Parsons S, Martini R, Williams SE, Mee L, Sexson S, Austin J, Winkel G, Boulad F, Redd WH. Coping and the course of mother's depressive symptoms during and after pediatric bone marrow transplantation. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2003; 42:1055–1068. [PubMed: 12960705]
- Needle JS, O'Riordan M, Smith PG. Parental anxiety and medical comprehension within 24 hrs of a child's admission to the pediatric intensive care unit. *Pediatric and Critical Care Medicine*. 2009; 10:668–674.
- Olde E, van der Hart O, Kleber R, van Son M. Posttraumatic stress following childbirth: a review. *Clinical Psychology Review*. 2006; 26:1–16. [PubMed: 16176853]
- Olley BO, Zeier MD, Seedat S, Stein DJ. Post-traumatic stress disorder among recently diagnosed patients with HIV/AIDS in South Africa. *AIDS Care*. 2005; 17:550–557. [PubMed: 16036241]
- Ozer EJ, Best SR, Lipsey TL, Weiss DS. Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. *Psychological Bulletin*. 2003; 129:52–73. [PubMed: 12555794]
- Pierrehumbert B, Nicole A, Muller-Nix C, Forcada-Guex M, Ansermet F. Parental post-traumatic reactions after premature birth: implications for sleeping and eating problems in the infant. *Archives of Disease in Childhood - Fetal and Neonatal Edition*. 2003; 88:F400–404. [PubMed: 12937044]
- Pinelli J. Effects of family coping and resources on family adjustment and parental stress in the acute phase of the NICU experience. *Neonatal Network*. 2000; 19:27–37. [PubMed: 11949118]
- Reichman SR, Feldman, Miller AC, Gordon RM, Hendricks-Munoz KD. Stress Appraisal and Coping in Mothers of NICU Infants. *Children's Health Care*. 2000; 29:279–293.
- Shaw RJ, DeBlois T, Ikuta L, Ginzburg K, Fleisher B, Koopman C. Acute stress disorder among parents in the neonatal intensive care nursery. *Psychosomatics*. 2006; 47:206–212. [PubMed: 16684937]
- Shaw RJ, Bernard R, DeBlois T, Ikuta L, Ginzburg K, Koopman C. Posttraumatic stress disorder in the neonatal intensive care nursery. *Psychosomatics*. 2009; 50:131–137. [PubMed: 19377021]

- Snell DL, Siegert RJ, Hay-Smith EJ, Surgenor LJ. Factor Structure of the Brief COPE in People With Mild Traumatic Brain Injury. *The Journal of Head Trauma Rehabilitation*. 2011 [Jan 17 2011. Epub ahead of print].
- Spiegelman D, Hertzmark E. Easy SAS Calculations for Risk or Prevalence Ratios and Differences. *American Journal of Epidemiology*. 2005; 162:199–200. [PubMed: 15987728]
- Spielberger, C. *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press; 1983.
- Tedstone JE, Tarrier N. Posttraumatic stress disorder following medical illness and treatment. *Clinical Psychology Review*. 2003; 23:409–48. [PubMed: 12729679]
- Watson CG, Davenport E, Anderson PE, Mendez CM, Gearhart LP. The relationships between premilitary school record data and risk for posttraumatic stress disorder among Vietnam war veterans. *Journal of Nervous and Mental Disease*. 1998; 186:338–344. [PubMed: 9653417]
- Young Seideman R, Watson MA, Corff KE, Odle P, Haase J, Bowerman JL. Parent stress and coping in NICU and PICU. *Journal of Pediatric Nursing*. 1997; 12:169–177. [PubMed: 9198340]
- Zohar J, Fostick L, Cohen A, Bleichm A, Dolfen D, Weissman Z, Doron M, Kaplan Z, Klein E, Shalev AY. Israeli Consortium on PTSD. Risk factors for the development of posttraumatic stress disorder following combat trauma: a semiprospective study. *Journal of Clinical Psychiatry*. 2009; 70:1629–1635. [PubMed: 19852906]

Table 1**Bivariate Associations of Subject Characteristics and Coping Styles**

Subject Characteristics	Emotion-Focused	Problem-Focused	Dysfunctional
Race/Ethnicity			
Caucasian ($n = 28$)	25.4 ± 4.8^a	17.9 ± 4.0^a	22.6 ± 4.5^a
Asian ($n = 10$)	27.5 ± 5.5^a	18.8 ± 3.6^a	22.9 ± 6.0^a
Hispanic ($n = 10$)	21.5 ± 5.2^b	13.0 ± 5.5^b	18.0 ± 6.3^b
Other ($n = 2$)	30.5 ± 2.1	19.0 ± 4.2	27.5 ± 7.8
Marital Status			
Single/Separated/Divorced ($n = 3$)	20.7 ± 7.2	11.7 ± 9.0	19.0 ± 12.1
Married/Partnered ($n = 47$)	25.5 ± 5.1	17.5 ± 4.2	22.1 ± 5.1
Total Household Income Before Taxes			
< \$20,000 – \$59,999 ($n = 11$)	23.9 ± 7.6	16.5 ± 6.6	19.5 ± 6.5
\$60,000 – \$99,999 ($n = 10$)	26.9 ± 5.3	15.8 ± 4.5	24.5 ± 6.6
\$100,000 ($n = 28$)	25.0 ± 4.2	18.0 ± 3.8	22.1 ± 4.6
First Child			
No ($n = 25$)	24.4 ± 5.9	16.2 ± 5.4	22.2 ± 6.4
Yes ($n = 25$)	26.0 ± 4.7	18.0 ± 3.7	21.6 ± 4.7

Mean $\pm$ SD are shown.

Groups with different superscripts are significantly different at $p < .05$

Table 2

Bivariate Associations of Maternal Characteristics with PTSD at one-month follow-up

	PTSD Not Present	PTSD Present
Maternal Characteristics		
Age	32.5 ± 5.1	32.9 ± 4.6
Race/Ethnicity (%)		
Caucasian (<i>n</i> = 28)	61%	39%
Hispanic (<i>n</i> = 10)	90%	10%
Asian (<i>n</i> = 10)	80%	20%
Other (<i>n</i> = 2)	50%	50%
Marital Status		
Single/Separated/Divorced (<i>n</i> = 3)	100%	0%
Married/Partnered (<i>n</i> = 47)	68%	32%
Education (yrs; <i>M</i> ± <i>SD</i>)	15.2 ± 2.6	17.3 ± 3.0 [*]
Total Household Income Before Taxes (%)		
< \$20,000 – \$59,999 (<i>n</i> = 11)	91%	9%
\$60,000 – \$99,999 (<i>n</i> = 10)	70%	30%
\$100,000 (<i>n</i> = 28)	61%	39%
First Child		
No (<i>n</i> = 25)	76%	24%
Yes (<i>n</i> = 25)	64%	36%
Maternal coping styles		
Emotion-focused	24.7 ± 5.6	26.6 ± 4.5
Problem-focused	16.3 ± 4.9	19.1 ± 3.4 [*]
Dysfunctional	20.7 ± 5.6	24.7 ± 4.5 [*]

Mean ± SD are shown for continuous variables; % are shown for categorical variables.

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

Table 3

Association of Maternal Education and Baseline Coping Styles with the Relative Risk of PTSD at One Month Follow-Up

	Relative Risk	95% CI
Model 1		
Education	1.19	1.01, 1.39 *
Emotion-focused Coping	1.03	0.94, 1.12
Intervention	0.76	0.32, 1.78
Model 2		
Education	1.15	0.99, 1.34
Problem-focused Coping	1.08	0.98, 1.18
Intervention	0.71	0.32, 1.61
Model 3		
Education	1.17	1.02, 1.35 *
Dysfunctional Coping	1.09	1.02, 1.15 **
Intervention	0.79	0.36, 1.77

* $p < .05$;

** $p < .01$