Published in final edited form as:
Issues Ment Health Nurs. 2013 August ; 34(8): 578–586. doi:10.3109/01612840.2013.789943.

PREVENTION OF POSTPARTUM TRAUMATIC STRESS IN MOTHERS WITH PRETERM INFANTS: MANUAL DEVELOPMENT AND EVALUATION

Richard J. Shaw[1], **Carrie Jean Brecht**[2], **Nick St. John**[3], **Emily Lilo**[4], **Julia Corcoran**[2], **Booil Jo**[1], **Shelley Howell**[2], **William Benitz**[3], **Nancy F. Feinstein**[5], **Bernadette Melnyk**[6], and **Sarah M. Horwitz**[7]

[1]Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Palo Alto, CA 94305

[2]The PGSP-Stanford Psy.D. Consortium, Palo Alto University, Palo Alto, CA

[3]Division of Neonatology, Lucile Packard Children's Hospital, Stanford University School of Medicine, Palo Alto, CA 94305

[4]Department of Pediatrics and Stanford Health Policy, Stanford University School of Medicine, Palo Alto, CA 94305

[5]University of Rochester, Rochester, NY 13104

[6]The Ohio State University, Columbus, OH 43210

[7]Department of Child and Adolescent Psychiatry, New York University Medical School, New York, New York 10016

Abstract

Premature birth has been associated with multiple adverse maternal psychological outcomes that include depression, anxiety, and trauma as well as adverse effects on maternal coping ability and parenting style. Infants and children who are premature are more likely to have poorer cognitive and developmental functioning and, thus, may be harder to parent. In response to these findings, there have been a number of educational and behavioral interventions developed that target maternal psychological functioning, parenting and aspects of the parent-infant relationship. The current study aimed to both develop and evaluate a treatment that integrates, for the first time, effective interventions for both reducing symptoms of posttraumatic stress disorder (PTSD) as well as enhancing maternal-infant interactions. Conclusions from the study indicate that the intervention is feasible, able to be implemented with a high level of fidelity, and is rated as highly satisfactory by participants. Though encouraging, these findings are preliminary, and future studies should strive to reproduce these findings with a larger sample size and a comparison group.

Keywords

neonatal intensive care; maternal distress; premature infants; posttraumatic stress disorder

Correspondence: Dr. Richard Shaw, Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, 401 Quarry Road, Palo Alto, CA 94305-5719; rjshaw@stanford.edu. Telephone: 650-723-5457.

Premature birth has been associated with a number of adverse maternal psychological outcomes that include depression and anxiety as well as symptoms of posttraumatic stress disorder (PTSD) (Holditch-Davis, Bartlett, Blickman, & Miles, 2003; Peebles-Kleiger, 2000; Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex, & Ansermet, 2003a; Schulz, Resick, Huber, & Griffin, 2006). These symptoms are associated with adverse effects on both maternal coping ability as well as parenting style. Research suggests that PTSD interferes with a mother's ability to form an integrated and balanced mental representation of her infant or young child (Schechter et al., 2005).

Mothers who meet either partial or full criteria for PTSD after childbirth have been found to view their infants as more difficult, less easily soothed, and more apt to be distressed, with potentially important negative implications for mother-infant attachment (Davies, Slade, Wright, & Stewart, 2008). Borghini et al. (2006), for example, found that only 20% of mothers with preterm infants had a secure attachment representation at age 6 months compared to 53% of full term infants. At the 18-month follow-up, the figures were 30% and 57%, respectively. Bialoskurski, Cox, & Hayes (1999) have postulated that this is likely due to the aspects of the infant's hospitalization in the neonatal intensive care unit (NICU), including the mother's separation from her baby after birth, reduced time spent with her infant, decreased participation in care, and lower frequency of interaction (Davis & Thoman, 1988). Additionally, mothers of premature infants more often perceive their infants to be difficult and report needing more time to develop feelings of affiliation (Leonard, Scott, & Erpestad, 1992; Levy-Shiff, Sharir, & Mogilner, 1989). Schechter et al. (2005) have shown that maternal PTSD related to domestic violence interferes with the formation of balanced, integrated mental representations of their infants.

Parents of premature infants may continue to view their child as vulnerable even after they are no longer medically fragile. As a result, these parents are significantly more likely to adopt parenting styles that are intrusive, rigid and, later, overprotective, sometimes labeled as the *vulnerable child syndrome* (Allen et al., 2004; Singer et al., 2003; Wightman et al., 2007). Research suggests that mothers of preterm infants who have high symptoms of posttraumatic stress and distorted representations of their infant are more likely to exhibit a *controlling* pattern of interaction, which is described as exhibiting hostility either overtly or covertly (Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Muller-Nix, 2011). This controlling pattern in preterm infant and mother dyads is associated with increased eating problems, impaired hearing-speech development, and diminished personal-social development. Thus, the patterns of interaction and attachment are not only more likely to be disrupted in mothers who have symptoms of PTSD, but may also have important long-term implications their premature infants' development. Miles and Holditch-Davis (1995) have also described the concept of *compensatory parenting*, a parenting style in which mothers provide special experiences and avoid others – specifically in the areas of stimulation, limit setting, protection and attention – in an attempt to compensate for the neonatal experiences of their children.

Interest in these issues has led to the development of interventions designed both to decrease general parental stress related to the NICU experience as well as improve outcomes in premature infants by enhancing interaction between infant-mother dyads. Early interventions focused primarily on efforts to enhance parent confidence and competence with their premature infants using a combination of techniques that include providing parents with information about infant characteristics and behavioral states and teaching them how to be sensitive to their infant's cues (Melnyk, Feinstein, & Fairbanks, 2002). More recently, there has been a shift to also incorporate cognitive behavioral techniques to alleviate symptoms of maternal depression and anxiety, which negatively impact maternal sensitivity and infant development (Feeley et al., 2008; Zelkowitz et al., 2008). There have

also been two recent interventions that specifically target parental PTSD using techniques based on principles of trauma focused cognitive behavior therapy (TFCBT) (Jotzo & Poets, 2005; Bernard et al., 2011). In addition, the Creating Opportunities for Parent Empowerment intervention (COPE: Melnyk et al., 2001) incorporates efforts to educate parents about the possibility of vulnerable child syndrome with the goal of limiting the development of an overprotective parenting style.

In the most recent review of therapeutic and behavioral treatments for parents of preterm infants, a trend was found towards early, brief interventions that are theoretically based, specifically target parent trauma, and utilize cognitive behavioral techniques (Brecht, Shaw, St John, & Horwitz, in press). This review found support for the use of interventions that focus on enhancing parental competence as well as reducing symptoms of psychological distress in parents. However, since no existing interventions systematically address both issues, this review also recommended that interventions should specifcally address parental stress, target symptoms of parental depression and anxiety and, simultaneously, incorporate early education about issues relevant to the parenting of premature infants, including awareness of and sensitivity to infant cues.

The current study aims to both develop and evaluate the feasibility of an intervention that is designed to reduce maternal symptoms of anxiety, depression and PTSD as well as enhance the quality of maternal-infant interactions in a sample of mothers of premature infants hospitalized in the NICU. The specific goals of these analyses are to evaluate the feasibility, fidelity, and participant satisfaction of the new intervention.

MANUAL DEVELOPMENT

The theoretical basis for this intervention is conceptually based on the combination of both Sameroff's Transactional Model (Sameroff, 1983, 1993) to address parenting and maternal sensitivity but also extends previous work by Bernard et al. (2011) which is based on the PTSD model to target parental trauma.

Maternal Sensitivity and Parent-Infant Interaction Treatment

Sameroff's model assumes that developmental outcomes are the result of the complex interaction between individual context and experiential context over time. In order to enhance mothers' ability to care for their infant, it is presumed that mothers need to integrate new information about the child's prematurity and health status into previously held beliefs about the imagined birthing and parenting experience and accept the loss of the *perfect child* (Hagan Evans., & Pope, 2004; Kersting et al., 2004; Miles, 1989). Not only do mothers need to learn about premature infant appearance, behavior, and how to care for them, but they also need to grieve their feelings of loss and gain acceptance in order to be more fully emotionally available to their new infant.

In addition, since mothers' emotional reactions may prevent them from recognizing developmental steps their infants are taking and as well as lead them to be overprotective, mothers must learn how to separate out their emotional reactions from their infants' actual medical and developmental status. We refer to this process as one of *infant redefinition* and to address this issue have incorporated material adapted from COPE (Melnyk et al., 2001) with permission from the authors. The goal of infant redefinition is to enhance optimal parenting and the mother-infant relationship by changing the mother's perceptions of her infant after birth and her perceptions of her own parenting experience (Sameroff & Fiese, 2000). Infant redefinition is based on the assumption that if parents no longer view their child as abnormal and difficult, they will be better able to engage in more normative care

giving interactions. Core components of current evidence-based treatments that address these issues are shown in Table 1.

Trauma Treatment

The intervention also draws on findings from the PTSD model, specifically research showing that parental PTSD has been associated with decreased maternal ability to cope with stressors in the NICU, distorted maternal perceptions of their infants (Schechter et al., 2005), increased feelings of detachment and separation from their infants (Brisch, Bechinger, Betzler, & Heinemann, 2003), and negative influences on their parenting (Ross & McLean, 2006). Specific interventions based on Trauma Focused Cognitive Behavior Therapy (TFCBT: Nemeroff et al., 2006; Resick & Schnicke, 1992) are integrated with the expectation that if mothers are able to reduce their trauma related symptoms they will be able to increase their coping ability, feel more bonded and attached to their infants, and improve their parenting ability.

Previous reviews of evidence based trauma treatment including TFCBT and Cognitive Processing Therapy suggests that core components of effective treatment should include psychoeducation, cognitive restructuring, relaxation training, and exposure (Nemeroff et al., 2006; Resick & Schnicke, 1992). In the current intervention, treatment utilized psychoeducation as a way to educate the mother about symptoms of PTSD and common feelings and thoughts of NICU parents to help her better understand the trauma and normalize her response to the NICU experience. Cognitive restructuring was incorporated in order to help the mother identify and differentiate feelings from thoughts and to recognize and challenge erroneous and maladaptive cognitions. Progressive muscle relaxation (PMR) and deep breathing was utilized to reduce symptoms of anxiety.

Exposure was incorporated into treatment by directing mothers to articulate their trauma narrative in either verbal or written form. Exposure continued in a subsequent session, during which mothers read their story with affective expression. The narrative is processed with the mother with the use of cognitive restructuring to challenge self-blame and irrational thoughts. Themes that were specifically addressed included guilt and self-blame for the premature birth, distress regarding their perceived lack of a true parental role, and pessimism about their infant's future.

Steps in Manual Development

The components that were incorporated into the proposed manual were selected following a literature review of previously mentioned existing effective treatments which were then combined in six sessions in a logical, sequential manner (see Table 2). Goals of each session were determined and documented. For sections of the manual that were primarily educational in nature, such as the relaxation techniques, the verbiage was scripted so that skills could be taught in a consistent manner using therapists of different backgrounds. For sessions that were necessarily more individualized to each participant, such as identifying the most traumatic portion of the infant's hospitalization, topics were identified in outline format. After the first draft of the manual was written, it was reviewed by a Scientific Advisory Board with members that included experts in PTSD in women, treatment development, parent-child attachment, neonatology, and implementation strategies.

Selection, Training, and Supervision of Therapists

Therapists were six female unlicensed graduate level doctoral candidates who were working towards completion of their Psy.D training and one female licensed clinical social worker. The graduate students were recruited through a clinical psychology graduate program affiliated with our institution and the social worker from the hospital NICU. Therapists

attended an eight-hour training during which they received logistical information about the pilot study and an orientation to the treatment manual. During this training, therapists were educated about the specific goals of each session and role-played specific sessions of the manual with the instructors. Therapists were trained in how to respond to possible participant responses through detailed explanations of typical participant statements and appropriate therapeutic responses. Additionally, trainers discussed the importance of close adherence to the manual. After this training, therapists practiced role-playing each session with a partner. All sessions were audiotaped and reviewed by senior members of the research team.

METHODS

Subjects

English speaking mothers of infants born between 26 and 34 weeks old, weighing over 1000 grams, born at the Lucile Packard Children's and El Camino Hospitals or transferred within 72 hours, without major health complications such as congenital abnormalities, and judged by physicians as likely to survive, were eligible for screening in the pilot study. Additionally, mothers who through routine clinical psychosocial evaluation were judged to be at high psychiatric risk, such as those with psychotic symptoms or suicidal or infanticidal ideation, were excluded. Mothers completed baseline screening measures including the Beck Depression Inventory, Second Edition [BDI-II; (Beck, Steer, & Brown, 1996)] the Beck Anxiety Inventory [BAI; Beck, Epstein, Brown, & Steer, 1988)], and the Davidson Trauma Scale [DTS: Davidson et al., 1997]. Only mothers who met the established clinical cutoff scores for anxiety, depression, or trauma symptoms on at least one of these scales were included in the study.

Baseline sociodemographic information for the first twenty participant mothers who comprised the fidelity sample is shown in Table 3. These mothers completed all six sessions of the intervention. The mean age of the participants was 34 years (*SD* = 6.5, range = 24–47). 10% of the sample self-identified as South Asian or Indian, 5% as Asian (5%), 5% as African American (5%), and 80% as Caucasian or European American. 25% of the women self-identified as Mexican American or Hispanic ethnicity. 25% of the mothers had not graduated college and were considered to have a low level of education, while 75% mothers had completed college or achieved a higher level of education. 55% of the women were employed thirty hours a week or more while 45% of the women were unemployed. 90% of the participants included in the sample were married or in a relationship similar to marriage and 10% were single.

Measures

Participants completed self-report measures to assess symptoms of anxiety, depression, and PTSD at screening (baseline) prior to treatment, and at post-treatment one to two weeks following the three-week intervention. At the post-treatment assessment, participants also completed the Maternal Satisfaction Questionnaire.

Beck Depression Inventory, Second Edition [*BDI-II; (Beck et al., 1996)*]—The BDI is a 21-item self-report questionnaire that assesses level of depressive symptom severity over a two-week period. The range of scores on this measure is minimal (0–13), mild (14–19), moderate (20–28), and severe (29–36). The reliability of the BDI-II is .92 (Beck et al., 1996), and it has been demonstrated to be a valid measure of depression (Arnau, Meagher, Norris, & Bramson, 2001).

Beck Anxiety Inventory [*BAI; (Beck et al., 1988)*]—The BAI is a 21-item self-report measure assessing common symptoms of anxiety. The range of scores on this measure is minimal (0–7), mild (8–15), moderate (16–25), and severe (26–63). The scale has high internal consistency (α = .92) and one week test retest reliability of .75 (Beck, 1988). It has also been shown to have good discriminate and concurrent validity (Beck, 1988).

Davidson Trauma Scale. [*DTS: (Davidson et al., 1997)*]—The DTS is a 17-item scale that assesses the DSM-IV symptoms of PTSD including intrusive re-experiencing, avoidance and numbness, and hyperarousal (Davidson et al., 1997). Scores greater than or equal to 20 qualify as at-risk and scores greater than or equal to forty indicate a likely diagnosis of PTSD. The scale has solid test-retest reliability (R = .86) and internal consistency (r = .99). At a score of 4, the DTS achieves an 83% diagnostic accuracy with the SCID (Davidson et al., 1997).

The Beck Depression Inventory-Second Edition [BDI-II; (Beck, 1996)]—The BDI-II is a 21-item self- symptom severity over a two-week period. The range of scores on this measure is minimal (0–13), mild (14–19), moderate (20–28), and severe (29–36). The reliability of the BDI-II is .92 (Beck, 1996), and it has been demonstrated to be a valid measure of depression (Arnau, Meagher, Norris, & Bramson, 2001).

Maternal Satisfaction Questionnaire—Mothers rated on a 1–5 Likert scale how helpful the sessions were both overall and individually, in addition to how satisfied they were with the sessions generally. Mothers were asked open-ended questions about what was most and least helpful about the sessions, which was the most helpful session, and if the sessions should be made available to other parents who have babies in the NICU. Additionally, they were asked in multiple choice format if the session length was appropriate, if the techniques taught were useful, and if participating while their child was still in the NICU was acceptable.

Fidelity Rating Scales—A fidelity rating checklist was created for each of the six sessions to allow evaluation of treatment fidelity, defined as the degree of accuracy with which the treatment was reproduced by the therapists during the implementation of the intervention. The checklist included all items that the therapist needed to address during each session based on the content in the manual. Checklists varied by session as to the number of points to be addressed ranging from a low of 15 to a high of 36 points. Examples of key session points include examining and explaining the roles of responsibility and blame in premature birth and relating it to the client's experiences, being empathetic and validating throughout the session, and explaining PMR. Four sessions were reviewed and rated by two individuals trained on the intervention to assess the inter-rater reliability of the fidelity assessments. Additionally, therapists were asked to rate, on a three point scale (ranging from not at all achieved to completely achieved), how well they thought that they had met the major goals of each session and the main fidelity rater also rated how well the main goals of each session were met.

Treatment Intervention

The 6-session intervention lasted approximately 3 weeks with two 45–55 minute sessions delivered weekly. Two of the sessions were conducted at the bedside with the infant, and four sessions in a private room close to the NICU. In the current intervention, treatment utilized psychoeducation as a way to educate the mother about symptoms of PTSD and common feelings and thoughts of NICU parents to help her better understand the trauma and normalize her response to the NICU experience (see Table 2). Cognitive restructuring was incorporated in order to help the mother identify and differentiate feelings from thoughts and

to recognize and challenge erroneous and maladaptive cognitions. Progressive muscle relaxation (PMR) and deep breathing was utilized to reduce symptoms of anxiety. Exposure was incorporated into treatment by directing mothers to articulate their trauma narrative in either verbal or written form. Two sessions to address the issue of infant redefinition were incorporated with the goal of enhancing optimal parenting and the mother-infant relationship by changing the mother's perceptions of her infant after birth and her perceptions of her own parenting experience. Mothers were taught how to recognize infant states, how to respond appropriately to infant cues, optimal ways to handle and physically comfort their infant ("containing touch"), appropriate times to approach and interact with their infant, and education about infant development (see Table 1).

Statistical Analysis

To assess treatment fidelity, the mean, standard deviation, and range of items for each session across therapists and for each therapist over all six sessions were examined. To evaluate satisfaction with the intervention, the mean, standard deviation, and range for the maternal satisfaction scale were examined. Study data were collected and managed using REDCap electronic data capture tools hosted at the Stanford Center for Clinical Informatics. REDCap (Research Electronic Data Capture: Harris et al, 2009) is a secure, web-based application designed to support data capture for research studies.

RESULTS

Treatment Fidelity

Fidelity was first assessed using the total number of items completed for each session based on the fidelity rating checklist. In Table 4, we report overall fidelity for each session, specifically the percent of the total number of items correctly completed by all therapists. Since the maximum number of possible items varies across sessions, we report the percentage of items completed within each session. Results show that treatment fidelity was highest in in Session 2 (97%) and the lowest in Session 6 (88%). Overall, the proportions of items completed according to those specified in the treatment manual shows an excellent level of treatment fidelity across all six sessions.

In Table 5, we report overall the results used to determine each therapist's level of fidelity to the manual across participants. Results show that the proportions of items completed are extremely high and consistent across therapists. These findings demonstrate that therapists can be trained to a high degree of fidelity in the implementation of the manualized treatment intervention.

The reliability of the ratings was evaluated by comparing evaluations between raters and between the main rater and therapists. Inter-rater reliability was assessed based on average ratings in sessions 2 and 4. In session 2, the intra-class correlation (ICC) between raters was 0.80 ($p<0.001$), which is considered a substantial to almost perfect level of reliability (Kraemer, Lowe, & Kupfer, 2003). In session 4, the ICC was 0.78 ($p<0.001$), which also indicates a substantial level of reliability. Rater-therapists agreement on whether the major goals of the sessions were met was assessed based on average ratings in sessions 2 and 4. In session 2, the intra-class correlation (ICC) between raters was 0.52 ($p=0.007$), which is considered a moderate level of reliability. In session 4, ICC = 0.64 ($p=0.007$), which is considered a substantial level of reliability. Overall, results show that the ratings of treatment fidelity showed an excellent level of reliability.

Satisfaction Ratings

Table 6 shows the maternal satisfaction ratings of participants at the conclusion of the study on 5 point Likert scales where 5 indicates the highest possible satisfaction with the intervention. Participants rated the intervention with an overall satisfaction mean score of 4.63 (*SD* = 0.74, range = 3–5). Participants also rated the treatment with a helpfulness mean score of 4.25 (*SD* = 0.89, range = 3–5). These results suggest that the participants found the intervention to be both highly satisfactory and helpful in the context of their experience of having an infant in the NICU.

Maternal Symptoms

Preliminary outcome data is presented on a group of eight mothers who participated in the pilot study. At baseline measurement, the eight mothers included in the pilot study had a mean BAI score of 16.88 (SD = 6.38, range = 7–30). At post-treatment measurement, these mothers had a mean BAI score of 8.5 (SD = 8.16, range = 1–22). On average, the study participants' scores on the BAI decreased 8.34 points. Paired-sample t-tests revealed that this change was statistically significant $t(7) = 2.29$, $p = 0.03$. At baseline measurement, the eight study participants had a mean BDI-II score of 14.13 (SD = 5.54, range = 4–23). At posttreatment measurement, the study participants had a mean BDI-II score of 12.25 (SD = 7.32, range = 0–21). The mothers' scores on the BDI-II had a mean decrease of 1.88 points. Paired-sample t tests revealed that this change was not statistically significant $t(7) = 0.58$, $p = 0.34$. At pre-treatment measurement, the eight study participants had a mean DTS score of 29.25 (SD = 11.52, range = 15–45). At post-treatment measurement, these mothers had a mean DTS score of 27.13 (SD = 13.94, range = 2–44). The scores on the DTS for the study participants had a means decrease of 2.13 points. Paired-sample t tests revealed that this change was not statistically significant $t(7) = 0.38$, $p = 0.28$. While the findings on maternal anxiety are encouraging, the sample size is too small to draw conclusions about the efficacy of the intervention.

DISCUSSION

The aim of the study was to develop and evaluate the fidelity of an intervention for mothers of premature infants that integrates, for the first time, evidence-based treatments for reducing maternal symptoms of PTSD while simultaneously enhancing maternal-infant interactions. The theoretical model used to develop the treatment intervention was based on literature reviews of prior interventions for mothers of preterm infants which have shown enhancements in parental competence following behavioral/informational interventions (Melnyk et al., 2002; Brecht et al., in press) but which at the same time suggests that the failure to target parental trauma may limit therapeutic outcomes (Schechter et al., 2005).

Twenty mothers of premature infants who experienced elevated symptoms of depression, anxiety, and trauma were recruited for the pilot study. During our sample recruitment, we found that the majority of mothers screened for enrolment were eligible to participate – only three mothers who were screened did not meet the clinical cut off based on maternal psychological distress – suggesting that this intervention may be appropriate for a large percentage of mothers with newborn preterm infants. This is consistent with prior studies of psychological distress including PTSD in parents with infants hospitalized in the NICU (Pierrehumbert et al., 2003; Schulz et al., 2006; Shaw et al., 2006, 2009).

Preliminary conclusions from the pilot study suggest that this intervention is both feasible and useful to mothers in the NICU setting. Data from the maternal satisfaction ratings shows that mothers who completed the study found the treatment to be both helpful and highly satisfactory. Specifically, mothers indicated that the sessions helped them to express,

identify, and cope with their feelings. They also reported that the opportunity to understand their psychological reactions to their infants' preterm birth, to have their feelings normalized, and to learn ways to better cope were invaluable. In particular, the sessions that incorporated cognitive restructuring and progressive muscle relaxation were rated highly by most mothers. In addition, mothers indicated that learning about their infant's development and ways to care for and connect with their preterm infant was also helpful confirming the value of the multifocal nature of the intervention.

Treatment fidelity was assessed in the pilot study to determine whether or not it is possible to train therapists with a diverse professional background and without specialized experience in psychological treatments to deliver the intervention. Statistical analyses suggest that treatment fidelity, as measured by the therapists' adherence to the written manual, was high both across sessions and across therapists. The high level of fidelity assures that each of the participants received equivalent treatment and that the treatment was implemented in a consistent manner. The finding that it is possible to utilize bachelors' level individuals to implement this treatment after only eight hours of training has important implications for the possible dissemination of the program into usual care settings. Access to mental health care is a major concern for mothers in the NICU setting particularly in non-academic medical centers. Cunningham (2009), for example, found that two-thirds of physicians were unable to obtain mental health care for their patients due to unavailability of providers, health plan challenges, and inadequate coverage. The fact that such a high level of fidelity was achievable consistently and across multiple therapists indicates that it is both highly reproducible and therefore potentially accessible as part of the standard of care for mothers in the NICU.

There are several important limitations in this pilot study. Since the aim of this report is to describe the concept of the intervention and the process of manual development, outcome data is limited to maternal satisfaction and fidelity ratings along with very preliminary results on maternal psychological symptoms. There is no control group and our sample is drawn from a relatively high sociodemographic group. In addition, fathers were not included in the study sample. Nonetheless, conclusions from this fidelity study indicate that the intervention is feasible, able to be implemented with a high level of fidelity by unlicensed, and is rated as highly satisfactory by participants. In terms of future directions, it will be important to evaluate outcomes with respect to maternal well-being – specifically both short and long term changes in symptoms of depression, anxiety and PTSD – as well as evaluating its effect on maternal-infant interactions and infant development. Future studies should also strive to reproduce these findings with a larger sample size and a comparison group.

Acknowledgments

Drs. Kimberly Yonkers and Patricia Chamberlain from our Scientific Advisory Group

Supported by R34-MH086579A to Drs. Shaw and Horwitz and National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health, through grant UL1 RR025744.

REFERENCES

Allen EC, Manuel JC, Legault C, Naughton MJ, Pivor C, O'Shea TM. Perception of child vulnerability among mothers of former premature infants. Pediatrics. 2004; 113(2):267–273. [PubMed: 14754937]

Arnau RC, Meagher MW, Norris MP, Bramson R. Psychometric evaluation of the Beck Depression Inventory-II with primary care medical patients. Health Psychology. 2001; 20(2):112–119. [PubMed: 11315728]

Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. Journal of Consulting and Clinical Psychology. 1988; 56(6):893–897. [PubMed: 3204199]

Beck, AT.; Steer, RA.; Brown, GK. Beck Depression Inventory-Second Edition. San Antonio, TX: Pearson Education, Inc., Harcourt Assessment; 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(2):230–234. [PubMed: 21438016]

Bialoskurski M, Cox CL, Hayes JA. The nature of attachment in a neonatal intensive care unit. The Journal of Perinatal & Neonatal Nursing. 1999; 13(1):66–77. [PubMed: 10633666]

Borghini A, Pierrehumbert B, Miljkovictch R, Muller-Nix C, Forcada-Guex M, Ansermet F. Mother's attachment representations of their premature infant at 6 and 18 months after birth. Infant Mental Health Journal. 2006; 27(5):494–508.

Brecht C, Shaw RJ, St John N, Horwitz SM. Effectiveness of therapeutic behavioral interventions for parents of low birth weight premature infants: A review. Infant Mental Health Journal. in press

Brisch KH, Bechinger D, Betzler S, Heinemann H. Early preventive attachment-oriented psychotherapeutic intervention program with parents of a very low birthweight premature infant: results of attachment and neurological development. Attachment & Human Development. 2003; 5(2):120–135. [PubMed: 12791563]

Cunningham PJ. Beyond parity: primary care physicians' perspectives on access to mental health care. Health Affairs. 2009; 28(3):490–501.

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 post-traumatic stress disorder. Psychological Medicine. 1997; 27(1):153–160. [PubMed: 9122295]

Davies J, Slade P, Wright I, Stewart P. Posttraumatic stress symptoms following childbirth and mothers' perceptions of their infants. Infant Mental Health Journal. 2008; 29(6):537–554.

Davis DH, Thoman EB. The early social-environment of premature and full-term infants. Early Human Development. 1988; 17(2–3):221–232. [PubMed: 3208677]

Feeley N, Zelkowitz P, Charbonneau L, Cormier C, Lacroix A, Marie CS, Papageorgiou A. Assessing the feasibility and acceptability of an intervention to reduce anxiety and enhance sensitivity among mothers of very low birth-weight infants. Advances in Neonatal Care. 2008; 8(5):276–284. [PubMed: 18827517]

Forcada-Guex M, Borghini A, Pierrehumbert B, Ansermet F, Muller-Nix C. Prematurity, maternal posttraumatic stress and consequences on the mother-infant relationship. Early Human Development. 2011; 87(1):21–26. [PubMed: 20951514]

Hagan R, Evans SF, Pope S. Preventing postnatal depression in mothers of very preterm infants: A randomised controlled trial. Bjog-an International Journal of Obstetrics and Gynaecology. 2004; 111(7):641–647. [PubMed: 15198752]

Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. Journal of Biomedical Informatics. 2009; 42(2):377–81. [PubMed: 18929686]

Holditch-Davis D, Bartlett TR, Blickman AL, Miles MS. Posttraumatic stress symptoms in mothers of premature infants. Journal of Obstetric, Gynecologic, & Neonatal Nursing. 2003; 32(2):161–171.

Jotzo M, Poets CF. Helping parents cope with the trauma of premature birth: an evaluation of a trauma-preventive psychological intervention. Pediatrics. 2005; 115(4):915–919. [PubMed: 15805364]

Kersting A, Dorsch M, Wesselmann U, Ludorff 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(5):473–476. [PubMed: 15581651]

Kraemer, HC.; Lowe, KK.; Kupfer, DJ. To your health: how to understand what research tells us about risk. Oxford University Press; 2003.

Leonard BJ, Scott SA, Erpestad N. Maternal perception of first-born infants: a controlled comparative study of mothers of premature and full-term infants. Journal of Pediatric Nursing. 1992; 7(2):90–96. [PubMed: 1569530]

Levy-Shiff R, Sharir H, Mogilner MB. Mother- and father-preterm infant relationship in the hospital preterm nursery. Child Development. 1989; 60(1):93–102. [PubMed: 2702878]

Melnyk BM, Alpert-Gillis L, Feinstein NF, Fairbanks E, Schultz-Czarniak J, Hust D, Sherman L, LeMoine C, Moldenhauer Z, Small L, Bender N, Sinkin RA. Improving cognitive development of low-birth-weight premature infants with the COPE program: a pilot study of the benefit of early NICU intervention with mothers. Res Nurs Health. 2001; 24(5):373–389. [PubMed: 11746067]

Melnyk BM, Feinstein NF, Fairbanks E. Effectiveness of informational/behavioral interventions with parents of low birth weight (LBW) premature infants: An evidence base to guide clinical practice. Pediatric Nursing. 2002; 28(5):511–516. [PubMed: 12424989]

Miles MS. Parents of critically ill premature infants: Sources of stress. Critical Care Nursing Quarterly. 1989; 12(3):69–74. [PubMed: 2819538]

Miles MS, Holditch-Davis D. Compensatory parenting: how mothers describe parenting their 3-year-old, prematurely born children. Journal of Pediatric Nursing. 1995; 10(4):243–53. [PubMed: 7562381]

Muller-Nix C, Forcada-Guex M, Pierrehumbert B, Jaunin L, Borghini A, Ansermet F. Prematurity, maternal stress and mother-child interactions. Early Hum Dev. 2004; 79(2):145–158. [PubMed: 15324994]

Nemeroff CB, Bremner JD, Foa EB, Mayberg HS, North CS, Stein MB. Posttraumatic stress disorder: a state-of-the-science review. Journal of Psychiatric Research. 2006; 40(1):1–21. [PubMed: 16242154]

Peebles-Kleiger MJ. Pediatric and neonatal intensive care hospitalization as traumatic stressor: Implications for intervention. Bulletin of the Menninger Clinic. 2000; 64(2):257–280. [PubMed: 10842450]

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. 2003; 88(5):400–404.

Resick PA, Schnicke MK. Cognitive processing therapy for sexual assault victims. Journal of Consulting and Clinical Psychology. 1992; 60(5):748–756. [PubMed: 1401390]

Ross LE, McLean LM. Anxiety disorders during pregnancy and the postpartum period: A systematic review. Journal of Clinical Psychiatry. 2006; 67(8):1285–1298. [PubMed: 16965210]

Sameroff, AJ. Developmental systems: Contexts and evolution. In: Kessen, W., editor. Handbook of child psychology. Vol. Vol. 1. New York: Wiley; 1983. p. 238-294.

Sameroff, AJ. Models of development and developmental risk. In: Zeanah, CH., editor. Handbook of infant mental health. New York: Guilford Press; 1993.

Sameroff, AJ.; Fiese, BH. Transactional regulation: The developmental ecology of early intervention. In: Shonkoff, JP.; Meisels, SJ., editors. Handbook of early childhood intervention. Cambridge: Cambridge University Press; 2000.

Schechter DS, Coots T, Zeanah CH, Davies M, Coates SW, Trabka KA, Marshall RD, Liebowitz MR, Myers MM. Maternal mental representations of the child in an inner-city clinical sample: Violence-related posttraumatic stress and reflective functioning. Attachment & Human Development. 2005; 7(3):313–331. [PubMed: 16210242]

Schulz PM, Resick PA, Huber LC, Griffin MG. The effectiveness of cognitive processing therapy for PTSD with refugees in a community setting. Cognitive and Behavioral Practice. 2006; 13(4):322–331.

Shaw RJ, DeBlois T, Ikuta L, Ginzburg K, Fleisher B, Koopman C. Acute stress disorder among parents of infants 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. The relationship between acute stress disorder and posttraumatic stress disorder in the neonatal intensive care nursery. Psychosomatics. 2009; 50:131–137. [PubMed: 19377021]

Singer LT, Fulton S, Davillier M, Koshy D, Salvator A, Baley JE. Effects of infant risk status and maternal psychological distress on maternal-infant interactions during the first year of life. Journal of Developmental & Behavioral Pediatrics. 2003; 24(4):233–241. [PubMed: 12915795]

Sue, S.; Zane, N.; Young, K. Research on psychotherapy with culturally diverse populations. In: Bergin, AE.; Garfield, SL., editors. Handbook on psychotherapy and behavior change. 4th ed.. New York: Wiley; 1994. p. 783-817.

Wightman A, Schluchter M, Drotar D, Andreias L, Taylor HG, Klein N, Wilson-Costello D, Hack M. Parental protection of extremely low birth weight children at age 8 years. Journal of Developmental & Behavioral Pediatrics. 2007; 28(4):317–326. [PubMed: 17700084]

Zane N, Hatanaka H, Park SS, Akutsu P. Ethnic-specific mental health services: Evaluation of the parallel approach for asian-american clients. Journal of Community Psychology. 1994; 22(2):68–81.

Zelkowitz P, Feeley N, Shrier I, Stremler R, Westreich R, Dunkley D, Steele R, Rosberger Z, Lefebvre F, Papageorgiou A. The Cues and Care Trial: a randomized controlled trial of an intervention to reduce maternal anxiety and improve developmental outcomes in very low birthweight infants. BMC Pediatrics. 2008; 8(38)

Table 1

Intervention Components to Enhance Maternal Sensitivity and Parent-Infant Interaction

1	Infant characteristics and behavioral states.
2	Sensitivity to their infant's cues.
3	Observation of infant competence and development.
4	Redefinition of the parental experience by recognition of changes in parental role.
5	Anticipation of future changes in parenting experience.
6	Increasing parental comfort and confidence.
7	Overprotective parenting.

Table 2

Session Content of the Treatment Manual

Session	Content of Session
1	Introduction to the NICU • Develop rapport. • Provide opportunity for mother to share her observations of her baby. • Educate mother about premature babies' appearance and behaviors. • Discuss things mother can do for her baby now.
2	Cognitive Restructuring • Empathize with and normalize reactions of parents in the NICU setting. • Help mother identify emotions and relationship between events, thoughts, and emotions. • Teach mother techniques: Examining the Evidence, What would I Tell a Friend, Positive Self Thoughts. • Assign an ABC-B Worksheet with Examining the Evidence
3	Progressive Muscle Relaxation • Brief review of ABC-B worksheet • Help the mother to accurately label her thoughts and emotions in response to events. • Reinforce the idea that changing thoughts can change the intensity or type of emotions that are experienced. • Help the mother to relax physically by teaching deep breathing and progressive muscle relaxation.
4	Introduction and Education about Trauma Focused CBT • Brief review of ABC-B worksheet • Help the mother to accurately label her thoughts and emotions in response to events. • Reinforce the idea that changing thoughts can change the intensity or type of emotions that are experienced. • Help the mother to relax physically by teaching deep breathing and progressive muscle relaxation.
5	Trauma Narrative • Have the mother read her trauma narrative with affective expression. • Identify the mother's stuck points for the event. • Challenge self-blame and irrational thoughts.
6	Infant Redefinition • Redefine infant: identify ways baby has changed • Redefine parenting experience: identify new things mother can do with baby • Introduce concept of, and ways to avoid, Overprotective Parenting • Introduce infant states, engagement and disengagement, and associated care-giving • Help mother to anticipate further changes in baby and parent-infant interactions

Table 3

Sociodemographic Characteristics of Mothers (n=20)

Characteristics	Participants (n=20)	Mean	Range
Age:		34	24–47
Younger (18–31)	8		
Older (32–50)	12		
Race:			
White	16		
Asian	1		
South Asian/ Indian	2		
African American	1		
Mexican American/ Hispanic Born in the U.S.	4		
Yes	10		
No	10		
Education:			
Low (< high school – some college)	5		
High (completed college or higher)	15		
Income:			
Low (< 70,000)	6		
High (70,000+)	14		
Employment			
Yes (30 hours a week or more)	11		
No	9		
Marital Status			
Married/ In relationship similar to marriage	18		
Single, Separated, Divorced	2		
Other Children:			
Yes, full-term	9		
Yes, premature	3		
No	8		

Table 4

Overall Fidelity by Session (average % of items completed)

Session	% Completed	SD	Range
1	95	4.77	85–100
2	97	4.29	84–100
3	90	10.94	70–100
4	93	4.90	80–100
5	95	8.18	67–100
6	88	23.15	5–100

Table 5

Overall Fidelity by Therapist (average % of items completed)

Therapist	% Completed	SD	Range
1	95	2.0	94–97
2	90	NA	90–90
3	97	3.4	92–97
4	97	NA*	97–97
5	94	5.8	80–94
6	98	2.2	93–98
7	99	2.2	93–99

* Too few subjects to calculate SD

Table 6

Maternal Ratings of the Intervention

Likert Scale Measure	Mean	SD	Range
Overall Satisfaction	4.63	0.74	3–5
Helpfulness	4.25	0.89	3–5