

ORIGINAL ARTICLE

Modification of the Perinatal PTSD Questionnaire to enhance clinical utility

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Objective: To enhance the clinical utility of the Perinatal Post-Traumatic Stress Disorder (PTSD) Questionnaire (PPQ), the current study sought to refine the measure by changing the item response options from dichotomous choices to a likert scale format.

Study Design: Using a convergent/divergent validity design and two data sources (traditional survey and World Wide Web), 58 high-risk and 86 low-risk mothers answered four questionnaires.

Results: Principal components analysis of items on the modified PPQ revealed three components conceptually similar to the diagnostic criterion associated with PTSD. In addition, convergent and divergent validity of the modified measure was supported. The clinical utility of the modified PPQ was established with a strong positive likelihood ratio.

Conclusion: The modified PPQ is a useful clinical tool for identifying mothers experiencing significant emotional distress during the postnatal period so they may be referred for mental health services.

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Introduction

In one of the first articles written about the psychological effects of premature delivery, Kaplan and Mason¹ state that mothers perceived the premature birth of their child as a threatening event and often expected the child to die. Since that article appeared, numerous quantitative and qualitative studies have reported that both mothers and fathers identify feeling threatened with the possibility that their infant may die (e.g.^{2–6}). As a result, increasing focus has been devoted to parents' reactions to infants, with multiple studies documenting the full range of post-traumatic sequelae (e.g., intrusive recollections, behavioral avoidance and

hyperarousal) as well as attachment difficulties following childbirth, even when there existed no direct threat to the life of the mother or her child(ren).^{7–20}

Given the potential for experiencing post-traumatic symptoms related to childbirth and the ensuing postnatal period, the Perinatal Post-Traumatic Stress Disorder (PTSD) Questionnaire (PPQ) was designed. To date, no other measure of post-traumatic symptoms has been developed specifically for use in this population. Good internal consistency (coefficient $\alpha = 0.85$) and test–retest reliability ($r = 0.92$) have been previously demonstrated on the PPQ.²¹ Furthermore, severity of neonatal complications and gestational age have been found to be predictive of PTSD symptomatology in parents as measured by the PPQ.^{21–23} In a study of the PPQ's convergent and divergent construct validity the correlations between the PPQ and each of the convergent measures (Impact of Events Scale; IES;²⁴ Penn Inventory²⁵) were significant,²³ while there was no correlation of the divergent measure with the PPQ, which indicates could construct validity.

More recently, Callahan *et al.*,²⁶ provided further evidence for the validity of the PPQ as a measure of PTSD in parents of infants. As in the earlier study, the correlations between the PPQ and each of the convergent measures (IES, and Beck Depression Inventory (BDI)-II,²⁷) were significant, with no significant correlation between the PPQ and the divergent measure (Openness scale of the NEO-PI-R;²⁸). However, in contrast to earlier findings, only the infant's birth weight, and not the infant's medical complications rating, was predictive of PPQ scores.

Although already a useful clinical instrument, the current study sought to refine the PPQ by changing the item response options from dichotomous choices to a likert scale format. By doing so, it was hypothesized that a factor analysis of items would reveal factors similar to the diagnostic framework associated with PTSD including intrusive recollections, avoidance and heightened arousal. Psychometrically, it was also expected that the measure's internal reliability would be improved. Finally, the change in response scaling would allow for a broader range of possible scores, without lengthening the measure, to improve the predictive utility for rapidly identifying distressed parents, directly at the point of service, so that such parents may be referred to mental health services.

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Method

With the approval of the Institutional Review Board at the University of Wisconsin-Milwaukee (UWM), parents were recruited from undergraduate psychology courses and from www sites aimed toward parents of premature and other high-risk infants.

Permission to advertise the on-line survey was obtained from www site owners prior to posting. The on-line and paper versions of the survey were designed to be as similar as possible. All participants acknowledged they were at least 18 years of age and provided informed consent after reading a full description of the study.

Mothers who had multiple premature infants were asked to respond to the birth of their first premature infant to control for possible frequency of exposure effects. Similarly, mothers who delivered only healthy, full-term infants were asked to describe the birth of their first baby. Finally, mothers of infants hospitalized in a neonatal intensive care unit (NICU) were asked to describe the birth of that child and the ensuing perinatal period.

Materials

The survey was comprised of several components. The first component collected parental demographic information including: occupation, educational level, marital status, parity and maternal age at the time of birth. Parental occupation and education level were combined using the two factor index of social position²⁹ to determine socioeconomic status (SES). Information gathered about the infant included: gender, gestational age, birth weight, type of delivery (cesarean or vaginal), length of infant's hospitalization and severity of the infant's postnatal complications. The eight-level postnatal complications rating (see Table 1) operationalized the severity of postnatal complications on a scale of zero (no complications) to seven (severe complications; e.g., grade IV intraventricular hemorrhage).

The second component of the survey consisted of a series of questionnaires. First among these was the modified PPQ (see

Appendix A), a 14-item measure assessing post-traumatic symptoms related to the childbirth experience, including intrusiveness or re-experiencing, avoidance behaviors and hyperarousal or numbing of responsiveness. The PPQ also contains one item pertaining to feelings of guilt. Response options were modified from the original dichotomous scale to a five-level likert scale (scored 0 to 4). Mothers were instructed to provide responses that reflected their experience during the targeted time frame (4 to 18 months postpartum). The total possible score on the modified PPQ ranged from 0 to 56. In the current investigation, internal consistency was superior to previous investigations using the dichotomous scaling, with an $\alpha = 0.90$.

Next, the IES was included as a convergent, widely used measure of post-traumatic stress that is not specific to any specific stressor condition.²⁴ Test-retest and internal reliability analyses have demonstrated good psychometric properties, as have examinations of the validity of the IES.^{13,24,30-33}

The Openness Scale from the NEO-PR²⁸ was then presented as a divergent measure. This is a measure of six related facets of cognitive functioning (active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity and independence of judgment). Adequate internal reliability and overall test-retest reliability has been reported.³⁴ Although total scores on the Openness scale are known to be related to aspects of intelligence, they are not related to emotional stability, achievement needs or agreeableness.²⁸

The next component of the survey was a 21-item, self-report measure of depression, the BDI-II.²⁷ Internal reliability and test-retest reliability with outpatient and student samples is excellent. According to the measure's author, the BDI-II is also significantly correlated with other well-established measures of depression and anxiety including the Beck Hopelessness Scale ($r = 0.68$), the Scale for Suicidal Ideation ($r = 0.37$), the Beck Anxiety Inventory ($r = 0.60$), the Hamilton Psychiatric Rating

Table 1 Neonatal complications rating scale

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0. No apparent complications
 1. Anemia (too few red blood cells), Hypocalcemia (low levels of calcium), hypoglycemia (low blood sugar), Jaundice (requiring phototherapy or bililights), Transient tachypnea (fast breathing) of newborn
 2. Apnea (periodic absence of breathing), Bradycardia (slowing of the heart rate), Feeding intolerance (more than 3 days)
 3. Respiratory distress syndrome (RDS or hyaline membrane disease)-on respirator less than 5 days, Inguinal hernia (around the groin), Intraventricular hemorrhage (IVH, bleeding within the brain)-Grade I, Pneumonia, Sepsis (infection)
 4. Hearing impairment, Meconium aspiration (inhaling meconium from the amniotic fluid), Patent ductus arteriosus (PDA), Persistent Fetal Circulation (PFC), Meningitis (infection of the brain and spinal column), Intraventricular hemorrhage-Grade II, Renal (kidney) failure, Retinopathy of prematurity (ROP: also, retrolental fibroplasia, RLF)-Stages 1 and 2
 5. Brain Edema (swelling of the brain), Hydrocephalus (excess fluids in the ventricles), Necrotizing Enterocolitis (NEC), Pneumothorax (collapsed lung), Respiratory distress syndrome-On respirator 5 or more days, Seizures, Retinopathy of prematurity, Stage 3
 6. Bronchopulmonary dysplasia (BPD), Congenital heart defect, Diaphragmatic hernia, Gastroschisis, Ileostomy, Intraventricular hemorrhage-Grade III, Other congenital abnormalities (e.g., Down's syndrome), Periventricular leucomalacia (PVL), Retinopathy of prematurity, Stages 4 and 5
 7. Intraventricular hemorrhage-Grade IV, Severe cardiopulmonary insufficiency indicating ECMO
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Scale for Depression ($r = 0.71$) and the Hamilton Rating Scale for Anxiety ($r = 0.47$).

Some directions (BDI-II and IES) were modified slightly so that all measures were assessing the same postnatal period (4 to 18 months following childbirth). At the conclusion of the survey, participants were asked whether they sought help from a mental health professional in response to their child's birth or hospitalization. They also were asked to rate their level of functional disruption on a five-point scale (from none to severe) in social, occupational and family role performance.

Results

Participants included 179 women with surviving infants responding to an internet-based survey. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS). Participants were eliminated from analyses if the amount of time that had elapsed since giving birth exceeded two standard deviations (s.d.) from the mean (i.e., 14 or more years since giving birth; $n = 35$) with follow-up analysis of latency revealing no significant difference between groups. Means and s.d. on demographic and selected birth variables are presented in Table 2 for each of the three groups: full-term, healthy infants (complications rating, see Table 1, of less than two and gestational age of 38 or more weeks) premature (less than 38 weeks gestation); and full-term, medically fragile infants (complications rating of 2 or higher and gestational age of 38 weeks or more).

Principal components analysis

To determine the relationship between items on the PPQ, principle components analysis of the modified PPQ, using an oblique promax rotation was conducted. The results revealed that the measure is comprised of three interpretable components. This three component model of the PPQ was found to be statistically robust (Kaiser-Meyer-Olkin (KMO) = 0.87). The largest component of the

PPQ, accounting for 44% of the total variance in scores, consisted of descriptors fitting criterion D (disruptions in arousal) of the Diagnostic and Statistical Manual (DSM)-IV-TR diagnostic framework for PTSD²⁹ with good internal consistency ($\alpha = 0.86$).

The next largest PPQ component, which accounts for 13% of total score variance, are mostly reflective of criterion C of the PTSD diagnostic framework (e.g., avoidance of stimuli associated with the trauma and numbing of general responsiveness). Internal consistency for this component was also good ($\alpha = 0.80$). Finally, the third component, accounting for 7% of the variance, consisted largely of items reflective of criterion B of PTSD (e.g., persistent re-experiencing). With only three items, internal consistency for items on this component was somewhat lower ($\alpha = 0.66$), though still acceptable. Appendix A specifically identifies the items comprising each component.

Convergent/divergent validity analyses

To compare the modified PPQ with the original measure, convergent and divergent validity was explored. First, as in prior PPQ studies,^{21,23,26} participants in the three groups were compared to one another based on their modified PPQ total scores. In comparison to the full-term, healthy infant group, *t*-tests revealed that both the full-term, medically fragile infant group ($t(91) = -2.551, P = 0.012$) and the premature infant group ($t(127) = -3.32, P = 0.001$) significantly differed according to total score on the modified PPQ. However, the preterm group and the medically fragile group did not differ from one another on the modified PPQ. As a result, these two groups were collapsed into a single group, labeled 'high-risk' for subsequent analyses. This finding mirrors that of prior PPQ investigations.^{21,23,26} Subsequent *t*-tests confirmed that this combined, 'high-risk' group scored significantly higher than mothers of term, healthy infants on the PPQ ($t(132) = -3.62, P = 0.042$), as well as on the IES ($t(132) = -4.04, P = 0.002$) and the BDI-II ($t(129) = 4.36, P = 0.039$). Group differences were nonsignificant on the Openness Scale, as shown in Table 3.

The PPQ had significant positive correlations with the convergent measures of the IES ($r = 0.74, P < 0.001$), and the

Table 2 Descriptive statistics for premature; full-term, medically fragile; and full-term, healthy infants on selected variables

Variable	Group		
	Premature (N = 47)	Fragile (N = 11)	Full term (N = 86)
Birth weight (g)	2050.02 ± 831.39	3287.18 ± 532.99	3546.48 ± 525.93
Gestational age	32.06 ± 4.16	40.45 ± 1.86	40.09 ± 1.15
Maternal age	26.33 ± 5.81	23.31 ± 3.90	24.94 ± 5.01
Days in hospital	31.20 ± 36.07	33.27 ± 96.80	2.60 ± 2.03
Time elapsed ^a	4.04 ± 3.79	5.17 ± 4.02	4.48 ± 3.40
Parental SES level ^b	3.95 ± 0.94	4.20 ± 0.63	4.25 ± 0.98

Abbreviation: SES, socioeconomic status.

^aTime elapsed since childbirth.

^bHighest SES level is 1; lowest SES level is 5.

Table 3 Mothers' scores on the four questionnaire measures

Measure	Group		D
	High risk (N = 58)	Full-term, healthy (N = 86)	
PPQ	19.29 ± 13.15	12.12 ± 10.24	0.61
IES	14.60 ± 11.46	7.54 ± 8.74	0.69
BDI-II	15.98 ± 12.34	13.03 ± 9.34	0.26
Openness Scale	29.53 ± 5.69	31.96 ± 6.37	-0.40

Abbreviations: BDI-II, Beck Depression Inventory II; *d*, Cohen's *d*; IES, Impact of Events Scale; PPQ, Perinatal Post-Traumatic Stress Disorder Questionnaire. Values are means ± s.d.

BDI-II ($r = 0.52, P < 0.001$), but not with the Openness scale ($r = 0.10, NS$). Tests for the difference between dependent correlations indicated that correlations among the convergent measures were significantly larger than any correlation of the Openness scale with a convergent measure. The PPQ/IES correlation was significantly stronger than the PPQ/BDI-II correlation ($t(128) = 2.84, P < 0.01$). The IES/BDI-II correlation ($r = 0.44, P < 0.01$) was nonsignificantly smaller than the PPQ/BDI-II correlation. In short, good convergent and divergent validity for the modified PPQ was indicated by analyses.

Risk for emotional distress analyses

Point bi-serial correlations revealed that cesarean delivery was positively correlated with scores on the PPQ ($r_{pb} = 0.27, P = 0.001$). In addition, scores on the PPQ were positively related to seeking therapy to resolve issues related to the birth and postnatal experiences ($r_{pb} = 0.29, P < 0.001$). In our sample, slightly more than 20% of mothers with medically fragile or premature infants reported seeking therapy to cope with their birth experience during ensuing post-partum period.

For further comparison with the original measure, and the established literature more generally, a hierarchic multiple regression analysis was performed using the PPQ total score as the criterion to determine which variables were most salient to predicting symptoms of traumatic distress in mothers. As seen in Table 4, after control variables were entered, only the infant's complications rating significantly increased the predictability of PPQ scores ($F \text{ Change}(1,118) = 35.15, P < 0.001$) in the full sample of mothers. This finding was replicated in a second hierarchic multiple regression analysis confined to only those mothers that gave birth to either a premature infant or a full-term, medically fragile infant ($F \text{ Change}(1,42) = 14.56, P < 0.001$). Supplemental analyses for both multiple regressions indicated

Table 4 Summary of hierarchical regression analysis for variables predicting modified PPQ score (total sample)

Variable	Step 1 (control variables)			Step 2		
	B	SE B	β	B	SE B	β
SES	0.25	1.16	0.02	0.26	1.02	0.02
Maternal age	0.05	0.21	0.21	-0.08	0.18	-0.04
Time elapsed	0.15	0.30	-0.05	-0.08	0.27	-0.03
Parity	-5.74	2.37	-0.23	-3.14	2.12	-0.13
Gestational age	—	—	—	0.02	0.16	0.88
Complications	—	—	—	3.38	0.57	0.50
NICU days of care	—	—	—	0.17	1.50	0.14
Birth weight	—	—	—	-0.05	-0.53	0.60
r^2	—	0.06	—	—	1.80	—
F for change in r^2	—	0.29	—	—	35.15**	—

Abbreviations: NICU, neonatal intensive care unit; SES, socioeconomic status.
** $P < 0.001$.

tolerance was high (0.91 to 0.95) and no difficulties associated with multicollinearity were evident, indicating that the predictive model was a good fit for each set of data (Table 5).

Clinical utility analyses

To improve the clinical utility of the modified PPQ at the point of direct service with mothers, we computed a clinical range cut score so that mothers that might benefit from a referral to therapy could be easily identified. Bayesian analyses were used for this purpose, which required that the sample be divided into two groups: those high-risk mothers that sought mental health treatment for assistance in coping with the birth of their child (PPQ $M = 26.55, s.d. = 10.72$) and those high-risk mothers that did not seek treatment (PPQ $M = 19.49, s.d. = 13.55$). Setting the clinical range at a score of 19 or above resulted in the good sensitivity (0.82), indicating that a score in the clinical range on the modified PPQ is likely to correctly identifies persons in need of a referral for therapy.

However, as population measures these values are difficult to interpret in clinical practice with individuals. Using Bayesian analyses, likelihood ratios were therefore computed for use directly at the individual patient level. The positive likelihood ratio for the modified PPQ is 1.78, while the negative likelihood ratio is 0.33. In other words, given a clinical range score (19 or above) on the PPQ, the likelihood that the individual is appropriate for referral to therapy is increased nearly double compared to other high-risk mothers who obtain scores below the clinical range.

Discussion

Principal components findings

Consistent with our hypotheses, principal components analysis of the PPQ revealed three components that appear to reflect the conceptually derived criterion used for diagnosing PTSD,³⁵

Table 5 Summary of hierarchical regression analysis for variables predicting modified PPQ score (high-risk mothers only)

Variable	Step 1 (control variables)			Step 2		
	B	SE B	β	B	SE B	β
SES	-2.03	2.59	-0.13	-3.36	2.25	-0.22
Maternal age	-0.12	0.38	-0.05	0.39	0.33	-0.18
Time elapsed	0.22	0.63	0.06	<0.01	0.54	<0.01
Parity	-9.19	4.49	-0.38	-5.74	3.96	-0.21
Gestational age	—	—	—	0.15	0.98	0.34
Complications	—	—	—	3.52	0.92	0.54
NICU days of care	—	—	—	0.12	0.66	0.52
Birth weight	—	—	—	<-0.01	-0.04	0.97
r^2	—	0.11	—	—	0.36	—
F for change in r^2	—	1.11	—	—	14.56**	—

Abbreviations: NICU, neonatal intensive care unit; SES, socioeconomic status.
** $P < 0.001$.

including: intrusion symptoms, avoidance symptoms and hyperarousal symptoms. Somewhat unexpectedly, an item that was thought to be indicative of persistent re-experiencing (item 2; upsetting memories) and an item assessing excessive feelings of guilt (item 14) loaded on the avoidance component. One possibility for this finding is that avoidance behaviors may be more pervasive in those women with upsetting memories or guilt feelings; perhaps as a means of lessening the distress associated with those particular symptoms. Future research is encouraged to examine this possibility. Finally, an item thought to measure hyperarousal (item 13; excessive jumpiness) instead loaded on the component reflecting persistent re-experiencing. Perhaps women experiencing more frequent intrusive private recollections find that they are more easily startled by external environmental cues. Again, future research is necessary to elucidate this possibility. Another important consideration is that these findings may simply reflect the need for further conceptual refinement of the PTSD diagnostic framework, as has been suggested elsewhere in literature on the diagnostic framework of PTSD.^{36–37}

Convergent and divergent validity

As has been previously reported for the original PPQ, an investigation into the convergent and divergent validity of the modified PPQ reveals a pattern of correlations that indicate the PPQ is measuring the intended construct. Further, the PPQ/BDI-II correlation lends support to the good specificity of the modified PPQ at measuring a pattern of distress specifically associated with trauma. As depression is a highly prevalent condition following any birth event,³⁸ but has differing treatment implications from PTSD, the good specificity of the PPQ to PTSD is of particular importance. In addition, internal consistency for the modified measure ($\alpha = 0.90$) is superior to the original measure.

Risk for postnatal emotional distress

Consistent with findings on the original PPQ,²⁶ several perinatal stressor variables (gestational age at birth, birth weight, complications rating and days of hospital care) were expected to be predictive of scores on the PPQ. After the control variables were accounted for, only the infant's complications rating significantly increased the ability to predict PPQ scores in mothers. This result is slightly different from the findings of DeMier *et al.*²¹ and Quinnell and Hynan.²³ Although the severity of neonatal complications was the strongest predictor of PPQ scores in those studies, gestational age subsequently added a small, yet significant increment for the prediction of PTSD. DeMier *et al.*²¹ also found that length of infant hospitalization was predictive. Finally, both DeMier *et al.*²¹ and Callahan and Hynan²⁶ reported that the infant's birth weight added a significant increment in the prediction of PPQ scores. The current finding that only severity of neonatal complications was predictive of modified PPQ scores may be interpreted as further

support for confirmatory factor analytic research on perinatal stressors,³⁹ which has found that two correlated factors (infant maturity and complications, $r = 0.60$) account for much of the variability observed in the covariance matrix of gestational age, birth weight, complications and days hospitalized. The significant overlap among these four variables (and the two factors) may only mean that the physical maturity of the infant was less salient in predicting modified PPQ scores than the severity of infant complications. In fact, we found that severity of neonatal complications and infant birth weight were correlated ($r = -0.57$) in this study, although somewhat less so than the correlation reported in the Callahan and Hynan²⁰ study ($r = -0.73$).

Clinical applications

Taken together, the findings indicate that clinicians might be wise to routinely screening mothers of infants with medical complications using the PPQ. This study finds that high-risk mothers who obtain a score of 19 or higher on the modified PPQ are nearly twice as likely to be appropriate for referral to mental health services. Physician screening of other mothers may be more focused to those suspected of experiencing symptoms associated with possible traumatic reaction.

As in the previous studies on the PPQ,^{23,26} we found that scores on the PPQ were correlated with seeking therapy to resolve issues related to the birth and/or hospitalization of the infant. This provides further evidence that the birth of a high-risk infant should be considered a stressor with the potential of being experienced as traumatic. Similarly, we found that the incidence of cesarean delivery of the infant (regardless of whether the child was later classified as high-risk or not) was correlated with scores on both the PPQ and the IES. This supports earlier research by Ryding *et al.*¹¹ in which the occurrence of PTSD was observed following cesarean deliveries and is consistent with Callahan and Hynan's²⁶ report of PPQ elevations following cesarean delivery.

Too few mothers of full-term, healthy infants in this sample acknowledged significant distress related to their childbirth experience for an examination of the generalizability of the modified PPQ to other potentially traumatizing variables encountered by mothers during childbirth. Future research addressing the generalizability of the measure to other childbirth experiences is therefore encouraged.

Researchers have identified an unfortunate cycle linking perinatal medical risk to postnatal maternal distress,^{2–7,12–20,39,40} poorer developmental outcomes,^{41,42} and disruptions in family functioning (especially maternal/infant relationships,^{43–45}). Examination of the positive predictive likelihood of the modified PPQ was good, indicating that high-risk mothers with a clinical range score on the modified PPQ are nearly twice as likely to be evidencing emotional distress at a level that merits referral for treatment. Hopefully, such interventions can facilitate improved outcomes in a range of areas, including child development and

family functioning and future research into such outcomes is encouraged.⁴⁶

Limitations

One limiting factor in this investigation is the reliance on retrospective reporting. Biases in memory or reporting may have impacted the present findings. The published paper detailing the standardization process of the original PPQ measure noted that most participants were assessed within 5 years of the birth, although in some cases more than 10 years had elapsed.²¹ Thus, we find the mean latencies in this study to be comparable to those reported during standardization of the original measure. Nevertheless, an investigation using a prospective design is encouraged.

In addition, another potential limitation is the use of the internet for some of the participant recruitment. Respondents to such recruitment may not be representative of the population of women experiencing preterm birth. However, women seeking support via the convenience of the internet (e.g., convenient in that you can log in spontaneously for support without having to work around scheduled meetings and arrange childcare), may be more likely to have experienced PTSD.

Finally, although the PPQ is the only measure presently available that has been developed for use in obstetric settings, other measures of post-traumatic reactions are available. A useful future investigation would be for a study focused on the comparative efficaciousness of the available measures that might be found in obstetric settings.

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Appendix A

Modified Perinatal Post-traumatic Stress Disorder Questionnaire (Modified PPQ)

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- (1) Did you have bad dreams of giving birth or of your baby's hospital stay?
 - (2) Did you have upsetting memories of giving birth or of your baby's hospital stay?
 - (3) Did you have any sudden feelings as though your baby's birth was happening again?
 - (4) Did you try to avoid thinking about childbirth or your baby's hospital stay?
 - (5) Did you avoid doing things that might bring up feelings you had about childbirth or your baby's hospital stay (e.g., not watching a TV show about babies)?
 - (6) Were you unable to remember parts of your baby's hospital stay?
 - (7) Did you lose interest in doing things you usually do (e.g., did you lose interest in your work or family)?
 - (8) Did you feel alone and removed from other people (e.g., did you feel like no one understood you)?
 - (9) Did it become more difficult for you to feel tenderness or love with others?
 - (10) Did you have unusual difficulty falling asleep or staying asleep?
 - (11) Were you more irritable or angry with others than usual?
 - (12) Did you have greater difficulties concentrating than before you gave birth?
 - (13) Did you feel more jumpy (e.g., did you feel more sensitive to noise, or more easily startled)?
 - (14) Did you feel more guilt about the childbirth than you felt you should have felt?
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Notes: Response scale and scoring weight for each question: (0) not at all; (1) once or twice; (2) sometimes; (3) often, but less than 1 month; (4) Often, for more than a month. Principal components analysis identified items 7, 8, 10 and 12 as the primary component. Component two consisted of items 4, 5, 2 and 73, while items 1, 3 and 13 loaded on component three. Clinical range for high-risk mothers is set at 19 or higher.