

Identifying Mothers at Risk for Postnatal Emotional Distress: Further Evidence for the Validity of the Perinatal Posttraumatic Stress Disorder Questionnaire

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OBJECTIVE:

We evaluated the construct validity of the Perinatal Posttraumatic Stress Disorder Questionnaire.

STUDY DESIGN:

Using a convergent/divergent validity design and two data sources (traditional survey and World Wide Web), 121 high-risk and 52 low-risk mothers answered four questionnaires.

RESULTS:

High-risk mothers scored higher than low-risk mothers on all measures of emotional distress. There were significant positive correlations among the convergent measures of emotional distress, which were significantly larger than any correlation of the divergent measure with a convergent measure. Scores on the Perinatal Posttraumatic Stress Disorder Questionnaire were positively related to mothers seeking formal psychotherapy for their childbirth experiences. Questionnaire responses were not related to data source.

CONCLUSION:

The Perinatal Posttraumatic Stress Disorder Questionnaire is a useful tool for identifying significant emotional distress in mothers during the postnatal period.

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INTRODUCTION

Many quantitative and qualitative studies have identified symptoms of posttraumatic stress disorder (PTSD) in mothers after the birth of both full-term babies^{1–4} and premature infants hospitalized in a neonatal intensive care unit (NICU).^{5–16}

The Perinatal PTSD Questionnaire (PPQ) is a self-report inventory designed to identify symptoms of PTSD that are related to the childbirth experience and the ensuing postnatal period. Using the PPQ, DeMier et al.^{8,17} found that mothers of high-risk infants reported more PTSD symptoms than mothers of full-term, healthy infants. Quinnell and Hynan¹⁸ also replicated earlier findings by DeMier et al.¹⁷ All of the studies using the PPQ have found that the severity of postnatal medical complications in the infant was the primary predictor of PTSD symptomatology in mothers. Quinnell and Hynan¹⁸ also evaluated the PPQ's convergent and divergent construct validity. The PPQ was found to have moderately high correlations with both convergent measures of PTSD selected for the study, whereas no correlation was found between the PPQ and the divergent measure.

The current study further addresses the validity of the PPQ as a measure of PTSD in mothers of high-risk infants. This study replicates some of the procedures of Quinnell and Hynan¹⁸ by using one of the same convergent validity measures of PTSD. Construct validity is further examined with a new convergent measure and a new divergent measure.

In addition, none of the previous studies has examined whether any differences existed between those parents who have experienced the birth of the child relatively recently and those whose experiences were more distant. There is reason to suspect that time-related differences might exist. In the longest follow-up study to date conducted on persons experiencing PTSD, it was found that over the course of 14 years, the prevalence rate of PTSD dropped from 44% to 28%.¹⁹ We wanted to determine if reports of PTSD symptoms were related to time since birth.

Based on previous literature, we predicted that mothers of high-risk infants would endorse more items than mothers of healthy, full-term infants on the PPQ and two well-validated convergent measures: the Impact of Event Scale (IES)²⁰ and the Beck Depression Inventory — Second Edition (BDI-II).²¹ The IES measures symptoms of unwanted reexperiencing, avoidance, and numbing of responsiveness related to PTSD. The BDI-II measures severity of depression, a disorder that is often comorbid with PTSD. Mothers in the two groups were not expected to significantly differ on their scores on the divergent measure, the Openness Scale of the NEO Personality Inventory — Revised.²² The Openness Scale measures cognitive functions related to intelligence.

All of the convergent measures selected for the study share a variance that is attributable to psychological distress. As a result,

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moderate correlations were predicted between the PPQ and the BDI-II, as well as between the IES and BDI-II. The PPQ and IES were also expected to share additional variance attributable to the specific symptoms of PTSD. Therefore, the correlation between the PPQ and the IES was expected to be significantly higher than the correlation between the PPQ and BDI-II. Because the divergent measure does not measure either general psychological distress or PTSD sequelae, no significant correlation was predicted between the Openness Scale and the other questionnaire measures. Lastly, we expected that the severity of the infant's postnatal complications would be a significant risk factor in predicting the endorsement of items on the PPQ.^{8,17,18}

METHOD

Participants

Parents were recruited from three sources: (1) World Wide Web (WWW) sites devoted to parents of premature and other high-risk infants; (2) the University of Wisconsin-Milwaukee (UWM) undergraduate psychology courses (our primary source of parents of healthy term infants); and (3) a conference for parents of premature infants.

The authors directly contacted owners of sites on the WWW to request permission to advertise the on-line survey. The on-line survey was designed to be as similar to the paper survey as possible. Data submitted through the on-line survey were coded and stripped of any link to the participant. The coded, anonymous data were sent directly to the primary researcher's e-mail account with only a time stamp and indication that the e-mail was from "survey participant."

Both the on-line and paper surveys began with a full description of the project and explained to participants that completion of the survey constituted an indication that the participant was at least 18 years of age and gave informed consent. The survey distributed to conference attendees was identical to the one distributed to undergraduates. Because only 14 fathers completed the survey, data analyses were performed only on the mothers' responses.

The data set was comprised of 175 anonymous participants ($N=94$ from the WWW, $N=62$ from UWM, and $N=19$ from conference attendees). High-risk participants consisted of mothers of infants born at less than 38 weeks of gestation ($N=111$) and mothers of medically fragile, full-term infants hospitalized in a NICU ($N=10$). The full-term, healthy group was comprised of infants born at greater than 38 weeks with no significant medical complications ($N=52$). Most of the mothers from the full-term, healthy group were recruited from UWM; mothers of high-risk infants were primarily recruited from the WWW and the conference. Descriptive statistics for these groups are provided in Table 1. This research was approved by the Institutional Review Board at UWM.

Materials

The first component of the survey collected the following demographic information about both of the child's parents:

Table 1 Descriptive Statistics for Premature; Full-Term, Medically Fragile; and Full-Term, Healthy Infants on Selected Variables

Variable	Group		
	Premature ($N=111$)	Fragile ($N=10$)	Full-term ($N=52$)
<i>Birth weight</i>			
M	1360.52	3414.50	3469.46
SD	711.11	506.22	465.62
<i>Gestational age</i>			
M	29.04	40.10	39.75
SD	3.95	1.73	1.06
<i>Maternal age at birth</i>			
M	29.76	27.10	23.04
SD	5.35	6.19	5.00
<i>Days in hospital</i>			
M	66.52	6.80	2.48
SD	53.83	5.96	1.59
<i>Time elapsed since birth (in years)</i>			
M	2.70	2.80	4.28
SD	3.57	1.93	5.65
<i>Parental SES level*</i>			
M	2.31	2.30	2.94
SD	0.94	1.25	1.07

*Highest SES level is 1; lowest SES level is 5.

occupation, educational level, marital status, and maternal age at the time of the birth. The occupation and educational level were used to determine socio-economic status (SES).²³ Also, we asked about the baby's gender, gestational age, birth weight, type of delivery (Cesarean or vaginal), length of the infant's hospitalization, and severity of the infant's postnatal complications. The Postnatal Complications Rating¹⁷ is an eight-unit scale quantifying the severity of postnatal complication (from none = 0 to extremely = 7). Examples of complications and respective ratings are: no apparent complications = 0; anemia, jaundice = 1; apnea, bradycardia = 2; pneumonia = 3; hydrocephalus, on respirator for 5 or more days = 5; intraventricular hemorrhage (grade IV) = 7. Mothers of premature infants were asked to describe the birth of their first premature infant because we expected that, typically, the birth of a first premature baby would be more stressful than the birth of a subsequent premature baby. Mothers of full-term infants hospitalized in a NICU were asked to describe the birth of that baby. Mothers who delivered only healthy, full-term infants were asked to describe the birth of their first baby.

The second component of the survey consisted of four questionnaires, beginning with the PPQ.¹⁷ Parents were instructed to answer affirmatively to the PPQ questions only if the particular experience lasted longer than 1 month during the targeted time frame, from 4 to 18 months postpartum. Questions on the PPQ

reflect the criteria for diagnosis of PTSD according to the *Diagnostic and Statistical Manual of Mental Disorders — Third Edition, Revised*.²⁴ The PPQ is comprised of 14 items and asks questions directly related to the birth experience along several dimensions: intrusiveness or reexperiencing the birth, avoidance behaviors, and hyperarousal. DeMier et al.¹⁷ found that the PPQ had an internal consistency (α coefficient) of 0.85 and a test–retest reliability of $r=0.92$. Scores on the PPQ range from 0 to 14. Mothers of high-risk infants have reported more symptoms on the PPQ than the mothers of healthy, full-term infants. Mothers with high scores on the PPQ have also sought professional mental health care for their childbirth experiences more often than mothers with low PPQ scores.^{8,17,18} For example, DeMier et al.¹⁷ reported that 33% of mothers of high-risk infants answering “Yes” to a configuration of responses on the PPQ that would have qualified for a diagnosis of PTSD (if the questions had been asked in a formal diagnostic interview) had also sought formal help from a counselor or psychotherapist for their perinatal experiences. This diagnostic qualification would have required at least six “Yes” responses. Eighteen percent of the mothers not meeting these criteria, but who answered at least four questions “Yes”, engaged in psychotherapy. Not one of the mothers of healthy, term infants sought therapy.

The next questionnaire was the IES, a well-validated measure of posttraumatic stress.²⁰ The IES measures avoidance behaviors and the intrusiveness of memories of an identified event. Scores on the IES range from 0 to 45. The test–retest reliability of the IES is $r=0.89$ on the intrusion subscale, and $r=0.79$ for the avoidance subscale. The total IES score has a test–retest reliability of $r=0.87$. In a more recent review of the reliability of the IES, Briere and Elliot²⁵ reported that the IES total score had a coefficient α of 0.94. Validity of the IES has been extensively examined and well supported.^{26–31}

The third questionnaire was the divergent measure, the Openness Scale, which measures six facets of cognitive functions: active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgment.²² Internal consistency of the six facets of the Openness Scale yielded coefficient α values from 0.58 to 0.80; its overall test–retest reliability was $r=0.86$.³² Total scores on the Openness Scale range from 0 to 48. Research has indicated that scores on the Openness Scale are related to components of intelligence, such as divergent thinking, which may contribute to an individual’s creativity.³³ Research on divergent validity has indicated that scores on the Openness Scale are not related to emotional stability, achievement needs, or agreeableness.²²

The last questionnaire was the BDI-II, a 21-item self-report tool that measures the severity of depression. Scores on the BDI-II range from 0 to 63. The coefficient α values for both an outpatient therapy sample and a student sample were $r=0.92$ and 0.93 , respectively. Test–retest correlations were very high $r=0.93$.²¹ Significant correlations were found between the BDI-II and (1) the Beck

Hopelessness Scale, $r=0.68$;³⁴ (2) the Scale for Suicide Ideation, $r=0.37$;³⁵ (3) the Beck Anxiety Inventory, $r=0.60$;³⁶ (4) the Hamilton Psychiatric Rating Scale for Depression, $r=0.71$;³⁷ and (5) the Hamilton Rating Scale for Anxiety, $r=0.47$.³⁸

Directions for both the IES and the BDI-II were modified slightly to reflect the postnatal period of 4 to 18 months. A final question at the conclusion of the survey asked participants whether they sought help from a mental health professional due to the experiences related to their child’s birth or hospitalization.

Analyses were conducted using the Statistical Package for the Social Sciences.³⁹ An α level of 0.05 was used for all statistical tests.

RESULTS

There were a total of 111 cases of premature infants and 100 of those came from either the WWW or the conference. Differences between the WWW and conference cases were nonsignificant for each of the four questionnaire measures.

Using SES as a covariate, an analysis of covariance revealed a significant effect of risk group on PPQ scores [$F(2,164) = 36.3, p < 0.001$]. SES was not related to PPQ scores. As Table 2 indicates, mothers in the high-risk category (mothers of premature infants and mothers of sick, term infants) scored significantly higher than mothers of term, healthy infants on the PPQ [$t(171) = 8.66, p < 0.001$], the IES [$t(169) = 5.25, p < 0.001$], and the BDI-II [$t(171) = 2.32, p < 0.05$]. Group differences were nonsignificant on the Openness Scale.

Correlations among the four questionnaire measures were computed for the whole sample. The PPQ had a positive correlation with the IES ($r=0.61, p < 0.001$), and the BDI-II ($r=0.58, p < 0.001$), but not with the Openness Scale ($r = -0.01$). 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 difference between the PPQ/IES correlation and the PPQ/BDI-II correlation was nonsignificant. The IES/BDI-II correlation ($r=0.42, p < 0.01$) was smaller than the PPQ/BDI-II correlation [$t(171) = 3.0, p < 0.01$].

Table 2 Mothers’ Scores on the Four Questionnaire Measures

Measure	Group		<i>d</i>
	High-risk (<i>N</i> = 121)	Full-term, healthy (<i>N</i> = 52)	
PPQ	7.7 ± 3.5	2.9 ± 2.8	1.52
IES	19.9 ± 10.2	11.0 ± 10.0	0.88
BDI-II	15.4 ± 11.6	11.3 ± 8.0	0.42
Openness Scale	35.8 ± 3.4	36.0 ± 3.5	0.06

d, Cohen’s *d*.
Values are mean ± SD.

Scores on the PPQ were positively related to seeking therapy to resolve issues related to the birth and postnatal experiences ($r_{pb}=0.45, p<0.001$). In fact, scores on the PPQ were more strongly correlated with seeking therapy than were scores on the IES ($r_{pb}=0.21, p<0.01$) or the BDI-II ($r_{pb}=0.23, p<0.001$). Scores on the Openness Scale were not significantly correlated with seeking therapy ($r_{pb}=0.00$).

A hierarchic multiple regression analysis was performed using the PPQ total score as the criterion. The following were entered first (in order) as the control variables: SES of the parents ($\beta=0.03, SE \beta=0.29$), mother's age at the time of giving birth ($\beta=-0.02, SE \beta=.06$), time elapsed since the birth ($\beta=-0.06, SE \beta=0.07$), and mother's parity ($\beta=0.09, SE \beta=0.57$). The following perinatal stressors were then entered into the equation (in order of largest to smallest univariate correlation): gestational age at birth, birth weight, severity of the infant's complications, and days of NICU care. The control variables accounted for less than 9% of the variance in PPQ scores. Only the infant's birth weight ($\beta=-0.53$) significantly increased the predictability of PPQ scores by accounting for an additional 20% of the variance [F change (1,153) = 43.6, $p<0.001$].

A second hierarchic multiple regression analysis conducted was confined only to those mothers who gave birth to either a premature infant or a full-term, medically fragile infant using the PPQ total score as the criterion. As in the first analysis, the following were entered first (in order) as the control variables: SES of the parents ($\beta=0.06, SE \beta=0.37$), mother's age at the time of giving birth ($\beta=-0.04, SE \beta=0.07$), time elapsed since the birth ($\beta=0.02, SE \beta=0.09$), and mother's parity ($\beta=0.08, SE \beta=0.66$). The following perinatal stressors were then entered into the equation (in order of largest to smallest univariate correlation): gestational age at birth, birth weight, severity of the infant's complications, and days of NICU care. The control variables accounted for less than 11% of the variance in PPQ scores. Only the infant's birth weight ($\beta=-0.31$) significantly increased the predictability of PPQ scores by accounting for an additional 8% of the variance [F change (1,109) = 9.84, $p<0.01$]. Supplemental analyses for both multiple regressions indicated no difficulties associated with multicollinearity.

Mother's age at the time of the child's birth was positively correlated with total scores on the PPQ ($r=0.26, p<0.001$), but not with the IES, the BDI-II, or the Openness Scale. The mother's age was also positively correlated with severity of infant complications ($r=0.50, p<.001$) and days hospitalized ($r=0.38, p<0.001$). Mother's age was inversely correlated with the child's birth weight ($r=-0.51, p<0.001$) and gestational age ($r=-0.49, p<0.001$). Time elapsed since the child's birth was negatively correlated with the BDI-II ($r=-0.16, p<0.05$). There was a trend towards a significant correlation between time elapsed and the PPQ total score ($r=-0.15, p=.057$), but correlations between time elapsed and (1) the IES and (2) the Openness Scale were nonsignificant. There were also positive correlations between time elapsed and the child's

gestational age at birth ($r=.16, p<0.05$), and the child's birth weight ($r=0.17, p<0.05$). The correlations between time elapsed and (1) complications severity and (2) length of hospitalization were nonsignificant.

Point biserial correlations revealed that Cesarean delivery was positively correlated with scores on both the PPQ ($r_{pb}=0.21, p<0.01$) and the IES ($r_{pb}=0.14, p<0.05$); however, Cesarean delivery was not related to the BDI-II and Openness Scale scores.

For the remaining analyses, data were placed into one of two groups. Cases reported within the first 2 years following the birth were placed into a perinatal period group ($N=107$). Cases were placed into a distant birth group ($N=60$) if more than 2 years had elapsed since the child's birth. The t -tests revealed nonsignificant differences between the groups on each of the four questionnaire measures.

DISCUSSION

Convergent and Divergent Correlations

The pattern of correlations among the questionnaire measures indicates that the PPQ, BDI-II, and the IES are measuring similar hypothetical constructs that differ from the construct related to the Openness Scale. Also, the lack of significant correlation between the convergent measures and the Openness Scale indicates that common method variance had little impact on correlations. This pattern provides additional support for the construct validity of the PPQ as a measure of both emotional distress and posttraumatic stress.

The correlation between the PPQ and the BDI-II was higher than expected. The results also indicated that the PPQ/IES correlation was not significantly greater than the PPQ/BDI-II correlation. There are several possible explanations for this finding. First, depression and anxiety disorders are often comorbid and many of the subjects scoring high on PTSD symptoms may also be experiencing depressive symptoms.⁴⁰ Second, some of the BDI-II items overlap with symptoms of anxiety and thus may not measure depression in a pure form. Third, the PPQ contains items related to arousal/agitation symptoms whereas the IES does not.

Differences Between Risk Groups

Mothers of high-risk infants reported more symptoms on the PPQ, BDI-II, and IES than mothers of full-term infants. There were no significant differences between these two groups on the Openness Scale. This is consistent with earlier research by Quinnell and Hynan;¹⁸ however, the current study also found slightly higher mean PPQ scores for mothers of both high-risk and full-term, healthy infants than that reported by Quinnell and Hynan. The mean IES score was also slightly higher in the present study for mothers of high-risk infants. Another difference between Quinnell and Hynan's findings and the present study is that in the present study, the IES mean for mothers of term, healthy infants was substantially higher ($M=11.00, SD=10.0$) than in Quinnell and Hynan's study

($M=6.8$, $SD=6.7$). One potential explanation for this difference is that Quinnell and Hynan's study utilized data collected longer after the birth of the child. The current study's design yielded data collected closer to the actual birth ($M=3.19$ years elapsed, $SD=4.26$) than the data from the Quinnell and Hynan study ($M=7.09$ years elapsed, $SD=7.22$). Our current results also support a tendency for the emotional impact of childbirth to decrease with the passage of time. We suspect that, in the current sample, the rather small correlations between time elapsed since birth and BDI-II scores ($r=-0.16$) and PPQ scores ($r=-0.15$) may also have been attenuated by a shortened range in time since birth.

Risk for Postnatal Emotional Distress

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, the infant's birth weight significantly increased the ability to predict PPQ scores in mothers. This result is slightly different from the findings of DeMier et al.¹⁷ and Quinnell and Hynan¹⁸ in which the severity of neonatal complications was the strongest predictor of PPQ scores. In these previous studies, gestational age subsequently added a small, yet significant increment for the prediction of PTSD. DeMier et al.¹⁷ also found that birth weight and days of infant hospital care also added significantly to the prediction of PTSD. In the present study, only the infant's birth weight added a significant increment in the prediction of PTSD. This discrepancy may be the result of differences between the sample in this study and the previous samples.

This discrepancy may also be viewed within the context of confirmatory factor analytic research on perinatal stressors.⁴¹ Two correlated factors (infant maturity and complications; $r=0.60$) account for much of the variability observed in the variance-covariance matrix of the following perinatal stressors: gestational age, birth weight, complications, and days hospitalized. The significant overlap among these four variables (and the two factors) may only mean that severity of infant complications was less salient in predicting PPQ scores in this sample than the physical maturity of the infant. In fact, we found that infant birth weight and the severity of neonatal complications were highly correlated ($r=-0.73$) in this study.

Secondary Analyses

As in the study of Quinnell and Hynan,¹⁸ 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 section in the 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.⁴ in

which the occurrence of PTSD was observed following Cesarean section deliveries.

Maternal age at delivery was related to shorter gestations, lower birth weights, more severe complications, and higher PPQ scores. Older mothers in our sample may have been more likely to utilize fertility treatments than younger mothers. Fertility treatments result in a greater incidence of multiple gestations and correspondingly premature deliveries.^{42,43} We also found that infants born more recently had lower average gestational ages and birth weights. Although the correlation was not statistically significant, a trend that mothers who delivered their infants more recently tended to have higher scores on the PPQ was also observed. Recent advances in the care of medically fragile infants, and a corresponding increase in survival rates, may account for these findings.⁴² We suspect that those mothers with younger babies and the experience of a higher-risk birth may also have been more likely to participate in our study.

This study does contain a number of limitations. It is difficult to determine the true representativeness of this sample with data collected from three sources. Additionally, although the mean birth weight and gestational ages of the full-term, medically fragile and full-term, healthy groups were comparable to those reported elsewhere in the literature, the premature group was comprised of infants who were smaller in weight and had lower gestational ages than reported in most of the literature. Furthermore, the method of determining infants' risk status could be improved by utilizing chart reviews instead of parents' recollections of events and information presented to them at a time of likely distress and possible confusion.

Another possible limitation is that some of the data were collected from the WWW. Although this method produced some benefits (e.g., greater cost efficiency, fewer data entry errors), it may also have resulted in sample problems. Previous research comparing data gathered from the WWW to paper-based methods indicate that results do not differ on the basis of the methodology;⁴⁴ however, few studies on this issue have been conducted to date.

Further research may wish to address these limitations by asking additional questions about the client's geographical location at the time of birth (to evaluate possible differences in neonatal treatments), the usage of fertility treatments prior to the conception of the infant being discussed, and whether or not the baby was part of a multiple gestation pregnancy. The use of longitudinal, prospective designs would facilitate our understanding of the precursors of postnatal emotional distress in parents. On a more general level, additional research comparing data collected from the WWW to more traditional methods is also encouraged. Lastly, the practical utility of the PPQ as a measure to screen for PTSD following childbirth might be broadened by research that includes parents in other situations. For example, this research neglected to identify families that had a multiple gestation pregnancy in which one or more child survived and one or more did not. In addition, parents of infants who did not survive and their postnatal experiences could be included in future research on the PPQ. A paucity of research exists on these populations.

Researchers have identified an unfortunate cycle linking perinatal medical risk to postnatal maternal distress,^{5–16} poorer developmental outcomes,^{45,46} and disruptions in family functioning (especially maternal/infant relationships).^{47–49} Our research suggests that psychological tests (such as the PPQ and other validated instruments) can be used to identify mothers (and families) at risk. Subsequent interventions can begin to break this unfortunate cycle.

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