



# Increased rate of parental postpartum depression and traumatization in moderate and late preterm infants is independent of the infant's motor repertoire



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## ABSTRACT

**Background:** Moderately and late preterm infants represent a considerable and increasing proportion of infants cared for in neonatal departments worldwide. Parents of preterm infants are at risk of postpartal depression (PPD) and posttraumatic stress disorder (PTSD), and preterm infants are at risk of developmental impairment. **Aim:** This study aimed to assess (1) the incidence of parental PPD and PTSD in moderate to late preterm infants in comparison to full-term infants and (2) the influence of infants' motor repertoire assessed by Prechtl's general movements and illness severity on parental PPD and PTSD.

**Subjects:** We studied 60 mothers and 56 fathers of 69 preterm infants (born at 32 to 37 weeks of gestation) and 32 mothers and 29 fathers of 34 full-term infants.

**Outcome measures:** We assessed the incidence of parental PPD, PTSD and perceived social support as well as infants' illness severity and motor repertoire at birth, term and 3 months corrected age.

**Results:** Preterm mothers and fathers had significant higher depression scores after birth compared to full-term parents ( $p = 0.033$  and  $0.021$ ). Preterm fathers also had higher traumatization scores compared to full-term fathers ( $p = 0.007$ ). Probable or possible PPD/PTSD was not associated with infant's illness severity or quality of motor repertoire. No differences in motor development were found between preterm and full-term infants.

**Conclusion:** Moderate to late preterm infants' parents are at increased risk for PPD irrespective of infants' motor repertoire or illness severity.

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## 1. Introduction

Moderate and late preterm infants born at 32 to 37 weeks of gestation account for the majority of preterm births requiring neonatal intensive care with numbers still increasing [1]. Just recently, late prematurity has been reported to significantly increase the risk of neonatal and long-term morbidities [2].

Distress of parents with infants admitted to a neonatal intensive care unit (NICU) has been shown to be triggered by fear for the infant's life and loss of the ability to care for the infant inducing feelings of sadness, helplessness and grief [3]. In addition to the impact of unavoidable early separation, the infant itself contributes to parental distress by emitting incomprehensible signals to which parents may not be able to respond adequately. Consequently, differences in communicative styles between premature and full-term infants' mothers have been reported describing preterm infants as less alert-attentive, active and responsive [4].

In vulnerable parents, these factors may increase the risk of postpartal depression (PPD) and posttraumatic stress disorder (PTSD). It is thus well conceivable that one third of mothers and one fourth of fathers with infants in neonatal intensive care display signs of acute stress disorder [5] and 24% of mothers of preterm infants were still traumatized after 6 months [6]. Moreover, subclinical PPD is observed in 17% of mothers of NICU treated infants after 1 month [5] and puts their infants at risk for developmental delay [7] and impaired mother-child interaction [8]. However, the impact of late prematurity on parental distress has not been well-studied to date [9].

Therefore, our study was conducted to assess the incidence of parental PPD and PTSD in a sample of moderate to late preterm infants after birth and at 3 months corrected age (CA). Infants' motor repertoire assessed by Prechtl's general movements, neurologic findings and illness severity were determined as potential influencing factors. We assumed that rates of parental PPD and PTSD were increased in the preterm sample and that preterm infants differ in the quality of their early motor repertoire compared to full-term infants. Finally, we hypothesized that parental PPD and PTSD rates correlate with decreased or abnormal motor repertoire or a high degree of illness severity in the child.

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## 2. Methods

### 2.1. Population

Our study was conducted at the Children's Hospital of the University of Cologne between November 2010 and August 2011. Families were recruited consecutively if eligible. Moderate and late preterm infants were recruited in the Department of Neonatology. Full-term controls were recruited in the maternity ward of the Department of Obstetrics and Gynaecology. The study was approved by the ethical committee of the University of Cologne, and informed consent was obtained from all parents prior to all study procedures.

We excluded infants with malformations, large and small for gestational age infants and full-term infants that needed medical treatment after birth. Furthermore, we excluded families with insufficient German language skills and with parental history of depression or other mental disorders.

We included 60 mothers and 56 fathers of 69 preterm and 32 mothers and 29 fathers of 34 full-term infants in the study. Recruitment rate was 50% of all eligible families. We excluded 10% for limited German language skills and five percent for meeting other exclusion criteria: Two preterm infants were small for gestational age, one full-term infant had pulmonary atresia and three mothers had a history of depression. Participation was refused by 35%. In four families (two preterm, two full-term) only the mother participated in the study and three mothers (two preterm, one full-term) were single parents. Seven parents of preterm and three parents of full-term infants did not keep appointments for follow-up examinations, could not be contacted or had moved away (drop-out rates 10.1 and 8.8%).

Preterm infants and their parents were assessed three times: between days 2 and 10 of life (t1), at term (t2) and at 3 months of corrected age (t3). Full-term infants were assessed twice: between days of life 2 to 10 (t1) and at 3 months of corrected age (t3). Mean corrected age at t3 was 10 weeks for preterm infants (range 9 to 16 weeks) and 11 weeks for full-term infants (range 9 to 14 weeks). Taken together, 62 preterm and 31 full-term infants completed all scheduled examinations.

### 2.2. Infants

We recorded baseline characteristics of infants and mothers, including birthweight, gestational age, head circumference at birth, gender, multiples, mode of delivery, Apgar score at 5 and 10 min, maternal age and parity. We additionally assessed need for respiratory support with continuous positive airway pressure and need for mechanical ventilation, length of hospital stay and incidence of intraventricular hemorrhage (IVH). Mechanical ventilation was used as a surrogate for illness severity.

Clinical neurologic examination was performed in preterm and full-term infants, and the Nursery Neurobiologic Risk Score (NBRS) was assessed for preterm infants. An NBRS >5 has a 100% positive predictive value for identifying infants with abnormal neurologic outcome [10]. Motor repertoire was assessed using Prechtl's general movements (GM). Infants' spontaneous movements were videotaped as recommended by Einspieler and Prechtl [11]. Two raters trained in the method scored infants' movements at t1 and t2 in three categories: normal, poor repertoire and cramped/synchronized. Videos recorded at 3 months (t3) were analysed for the absence or presence of fidgety movements.

Classic neurologic examinations were performed by pediatrician trained in the assessment of newborn and young infants and were based on Avery's Diseases of the Newborn [12]: appearance, behavior, state, or abnormal movements, visual and hearing responses, head size and shape, active and passive tone of major muscle groups, cranial nerves and primitive and deep tendon reflexes were assessed. At 3 months of age, we additionally assessed lack of head control.

### 2.3. Parents

Self-reporting methods were used to identify PPD, PTSD and the cofactor perceived social support. All questionnaires were handed out to mothers and fathers at t1, t2, and t3 for preterm parents and t1 and t3 for full-term parents. Questionnaires used were the Edinburgh Postnatal Depression Scale (EPDS), the Impact of Event Scale (IES-R) and the short version of the F-SozU (F-SozU K-22), measuring perceived social support.

The EPDS is a standardized instrument for the assessment of postpartal depression omitting symptoms such as tiredness or sleeping disturbances that are common after birth [13]. It was validated for mothers and fathers [14,15]. Scores >9 and ≤12 were used for defining possible and scores >12 for defining probable PPD as suggested by Cox et al. [13].

Horowitz's Impact of Event Scale (IES) is a general, reliable and valid self-report measure to evaluate psychological stress reactions after major life events [16,17]. It refers to a particular event (in this study birth) and measures two categories of responses: Intrusive experiences and avoidance of thoughts and images associated with that event. Parents report the frequency of symptoms in the past 7 days. Scores >0 indicate possible PTSD. We used the revised German version (IES-R) implemented by Maercker in 1998 [18].

Perceived social support was assessed with the short version of the F-SozU scale (F-SozU K-22). It contains 22 items from the three major scales "emotional support," "instrumental support," and "social integration," as well as two items on "satisfaction with social support" and on "person in a position of trust." Reliability and validity are satisfactory [19].

### 2.4. Statistics

Statistical analysis was performed using the SPSS 20.0 data analysis package (Munich, Germany) and SAS 9.3. Variables are given as median (1st quartile–3rd quartile) or mean ± standard deviation.

For testing, we used the chi-square test, *t*-test or Mann–Whitney *U* test as indicated. A *P*-value <0.05 was considered as statistically significant for single tests.

## 3. Results

Baseline characteristics show significant differences between preterm and full-term infants in expected parameters (Table 1).

### 3.1. Parental trauma, depression and social support

At t1, 20% of preterm mothers had probable PPD (>12 points) and 7% had possible PPD (>9 and ≤12 points). At t2 and t3, rates for probable PPD decreased to 11% and 6% while rates for possible PPD increased to 13% at t2 and decreased to 6% at t3. At t1, probable PPD was found in 2% of preterm fathers (>12 points) and 11% had possible PPD (>9 points). Rates for preterm fathers at t2 and t3 and full-term mothers and fathers are shown in Table 2.

EPDS Scores at t1 were significantly higher for preterm fathers and mothers compared to full-term parents ( $p = 0.033$  and  $0.021$ ). However, when comparing corresponding EPDS scores at term (t2 preterm, t1 full-term), significance is lost for mothers ( $p = 0.244$ ) but not fathers ( $p = 0.037$ ). Strikingly, median EPDS score decreased significantly from t1 to t3 in preterm mothers ( $p < 0.001$ ) but not in full-term mothers ( $p = 0.216$ ) or any group of fathers (preterm  $p = 0.096$ , full-term  $p = 0.597$ ). Interestingly, risks for maternal and paternal PPD were associated within families: in affected preterm and full-term fathers, 56% and 75% of the corresponding mothers had probable or possible PPD. However, illness severity, indicated by the need for mechanical ventilation, did not correlate with parental PPD at t1, t2 or t3 (all  $p > 0.425$ ).

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