Stress and feelings in mothers and fathers in NICU: identifying risk factors for early interventions

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Abstract

Aims: The aims of this study were to explore parents’ stress levels and negative feelings after premature births and to identify the risk factors related to parents’ stress and negative feelings during their children’s neonatal intensive care unit (NICU) stay. Background: Preterm birth is a multi-problematic event that may put the babies in danger for both their medical and neurophysiological conditions and could have a negative impact on both the mother–father relationship and the parent–child interactions. Methods: The study involved 43 mothers and 38 fathers of preterm infants. All participants filled out the Parental Stressor Scale: Neonatal Intensive Care Unit and the Profile of Mood States. Findings: The results revealed significant differences between mothers’ and fathers’ responses to preterm births in terms of both stress and negative feelings. We found that, for mothers, their own young age and the baby’s need for respiratory support were significant predictors of stress; for fathers, their own young age and the baby’s lower gestational age and worse condition at birth were significant predictors of stress and negative feelings. The NICU may be a stressful place both for mothers and fathers. Identifying which mothers and fathers are at risk immediately after their children are born could help to direct specific interventions that can reduce these parents’ stress and prevent them from negative feelings.

The World Health Organization (1977) defined preterm birth as one that occurs before 37 weeks of gestation. Until the 1990s, prematurity was defined on the basis of birth weight; however, in recent years, gestational age (GA) has been considered the main indicator of preterm babies’ physical and neurological maturation (Sansavini and Faldella, 2013).

Preterm birth is a multi-problematic event that may present different consequences for baby’s development and for parents’ experience (Ionio et al., 2016a; 2016b; 2017; Mascheroni and Ionio, 2018). It is well documented that preterm birth is associated with several poor outcomes in infants (especially for infants who have a GA of <32 weeks and those who weigh <1500 g) in various developmental domains, including motor, behavioural, cognitive, and sensory (Nepomnysachy et al., 2012; Voigt et al., 2012; de Jong et al., 2015; Ionio et al., 2016b).

Preterm birth may have a negative impact on parents’ experience as well (Sameroff and Chandler, 1975). In fact, the premature birth of the baby suddenly interrupts the building of parents’ mental representations and expectations. Additionally, the possible critical condition both of the baby and the mother may shock parents, turning preterm birth in a highly stressful or traumatic event for mothers and fathers (Singer et al., 2003; Ravn et al., 2012; Monti et al., 2013; Hoffenkamp et al., 2015). Such births are often the unexpected results of mothers’ medical complications; these complications require immediate interruption of the pregnancies, including in emergency situations, to prevent serious threats to the health of the babies and mothers (Coppola and Cassibba, 2004). Such trauma can damage the new relationship between the parents and their babies and can be a risk factor in the mother–infant relationship, which in turn can have a negative impact on the infants’ future developmental outcomes (Wigert et al., 2010; McManus and Poehlmann, 2012; Rogers et al., 2013; Ionio and Di Blasio, 2014; Di Blasio et al., 2017).

Different studies observed that premature birth generally interferes with transitions into parenthood and can be a potential risk factor for the construction of the parental function (Carter et al., 2007; Nicol-Harper et al., 2007; Goodman et al., 2011; Murray et al., 2011). During the neonatal intensive care unit (NICU) stay, the adverse medical conditions of the baby prevent parents from immediately taking care of their newborn children (Feldman et al., 1999; Goldberg and DiVitto, 2005; Axelin et al., 2010; Ionio et al., 2016a) and this may lead parents to experience higher level of stress, mostly because of parental role marginalization.
(Montirosso et al., 2012). In fact, when babies stay in the NICU, parents usually feel powerless, and they may be stressed and vulnerable to emotional difficulties (Clottery and Dillard, 2013; Sansavini and Faldella, 2013).

Preterm births can also interfere with parents’ everyday lives and routines. The parents spend many hours in the NICU, where they continue to experience the infant’s fragility (Clottery and Dillard, 2013) and live in a state of psychological and physical separation from their babies. This separation is aggravated by the artificial environment of the NICU, where in the days after the preterm delivery the medical staff – not the parents – used to take care of the infant’s well-being, often causing parents further pain and distress (Montirosso et al., 2011; Sansavini and Faldella, 2013). In fact, initially, parents could only observe their infants and routine procedures. Only once the baby’s condition has improved, and if the parents felt ready, they start to be involved by nurses in the daily care of their infants (De Bernardo et al., 2017). The sense of powerlessness that parents may perceive in this situation can alter parental roles and further increase negative feelings such as anxiety, depression, anger, helplessness, and confusion (Müller-Nix and Ansermet, 2009).

Other studies focused on the examination of potential risk factors that could influence parents’ reactions and feelings after the premature birth of their baby (Trombini et al., 2008). In particular, it was suggested that different demographic and clinical factors related to both parents and infants can influence parental stress levels and negative feelings in the NICU (DeMier et al., 2000; Müller-Nix and Ansermet, 2009). The extent of the infants’ premature characteristics and severity of their illness are predictors of parental stress. In fact, external infant characteristics are associated with immaturity and severity of medical status, which can in turn increase parental stress levels, thus interfering with the maternal and paternal roles (DeMier et al., 2000; Müller-Nix and Ansermet, 2009). It was also pointed out that babies’ neonatal characteristics, such as birth weight (<1500 g) and GA (<28 weeks), are related to parents’ levels of stress, depression, anxiety, and anger – both in mothers and in fathers (Dudek-Shriber, 2004; Franck et al., 2005; Zelkowitz et al., 2007; Chourasian et al., 2013; Alkozei et al., 2014; Woodward et al., 2014).

Moreover, demographic characteristics can also play an important role in predicting parents’ stress levels and negative feelings. Researchers have previously pointed out that stress levels and negative feelings in mothers are related to their education level, marital situation, partner-relationship quality, and perceived social support (Zelkowitz et al., 2007; Alkozei et al., 2014; Woodward et al., 2014; Di Blasio et al., 2015). Regarding paternal demographic characteristics, in previous studies, researchers have demonstrated that the presence of stress and negative feelings in fathers was related to both partner-relationship quality and perceived social support (Dudek-Shriber, 2004; Zelkowitz et al., 2007). However, other researchers have reported no association between stress levels and maternal demographics such as age, marital status, education, and employment status (Franck et al., 2005; Chourasian et al., 2013).

Starting from these conflicting results, for this study, we wanted to better clarify which risk factors play important roles in predicting maternal and paternal reactions and feelings immediately after preterm births. As researchers have pointed out (Ionio et al., 2016a; Ionio et al., 2018), it is important to consider the characteristics and points of view of both mothers and fathers, as both parents are at risk after premature births. Moreover, in most of the past studies, researchers have focussed on experiences over the longer period of the infants’ hospitalizations; the analysed situations have already become normal for many of the parents. For this reason, it is also important to focus on parents’ experiences immediately after the premature births of their babies, such as their first experiences in the NICU, to increase knowledge about both mothers’ and fathers’ initial reactions.

In particular, one of our aims in the present study was to explore stress levels and negative feelings in both mothers and fathers immediately after the premature births of their babies. In addition, we wanted to identify which risk factors can further increase parental stress levels and negative feelings in the NICU and which can further damage the beginning of the parent–child relationship that occurs immediately after delivery.

Identifying these risk factors and the role that they play in parents’ reactions and feelings could help clinicians to better organize and administer interventions to reduce stress and negative feelings, before parents become symptomatic (Hynan et al., 2013).

Methods

Participants and procedures

The current observational single-centre study was carried out from January 2013 to July 2015 in the NICU of the V. Buzzi Level III Hospital in Milan, Italy. This is the first part of a larger longitudinal study in which we tried to investigate the influences that mothers and fathers have on healthy preterm babies’ neuropsychological developmental outcomes from birth until preschool age.

The study was approved by hospital’s Research Ethics Committee, which required informed consent from each participant. Therefore, informed consent for the protection of privacy was a prerequisite to participate in the study. We recruited only Italian couples.

The inclusion criteria for newborns were GA <37 weeks, absence of congenital anomalies, and prenatally diagnosed brain lesions. Eligibility criteria for parents consisted of an age >18 years, no single-parent families, no manifest psychiatric or cognitive pathologies, and no drug addiction. The exclusion criteria for participation consisted of absence of informed consent.

All eligible parents were approached inside the NICU within 14 days of their infants’ births. During this period, parents were permitted to visit their baby for 10 h a day. The NICU’s rules consist of specified visiting hours. Both mothers and fathers can access the NICU from 11 am to 9 pm. Initially, parents can only observe their infants and routine procedures and only when they feel ready, they start to participate with nurses in the care of their infants.

During the first 2 weeks of infants’ NICU admission a research psychologist, introduced by the doctors of the ward, has presented the study to the parents, explaining that they would be involved in a longitudinal study that would investigate preterm children’s development from birth until preschool age.

If parents refused to participate (approximately 50% of the them, because they were totally focussed on their children), they were not enrolled in the study and no socio-demographic information was collected. If parents agreed to participate in the follow-up study, the researchers explained the content of the questionnaire to them. Parents who initially agreed usually did...
Parental and infant characteristics included. The sample couple. We obtained answers from both mothers and fathers of the same because they did not want to express their personal feelings. We fathers changed their mind after reading the questionnaires.

A total of 43 mothers and 38 fathers of preterm infants were included. The sample’s characteristics are summarized in Table 1.

### Measures

#### Parental stress levels and feelings

We used the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU; Miles, 2002; Italian version by Montirosso et al., 2012) to measure stress levels in mothers and fathers. The PSS: NICU measures parents’ perceptions of the NICU. It is composed of 34 items and each item rated on a 5-point Likert scale (not stressful to extremely stressful). Items are divided into three subscales that measure stress caused by the machines in the NICU (sights and sounds), stress related to the infants’ status (infant behaviour and appearance) and stress related to the parents’ perceptions of their ability to become a caregiver (parental role alteration). This questionnaire showed good psychometric properties: the test–retest reliability ranged from 0.69 for the subscales to 0.87 for the total scale; the internal consistency ranged from 0.73 to 0.92 for the subscales and from 0.89 to 0.94 for the total scale. In the present study, this tool showed excellent psychometric properties, with Cronbach’s $\alpha$ reliability coefficients ranging from 0.93 to 0.98. The mean scores for each subscale and the mean overall scores were calculated.

#### Profile of Mood States

We used the Profile of Mood States (POMS; McNair et al., 1971; Italian version by Farnè et al., 1991) to identify the presence of negative feelings in mothers and fathers. This questionnaire measures parents’ negative and positive mood states. It is composed of 58 items across six affective dimensions: tension–anxiety, anger–hostility, fatigue–inertia, depression–dejection, vigour–activity, and confusion–bewilderment. Previous studies demonstrated excellent psychometric properties: internal consistency (Cronbach’s $\alpha$) in the subscales ranging from 0.63 (confusion–bewilderment) to 0.96 (depression–dejection) (Curran et al., 1995). In the current study, this tool showed excellent psychometric properties, with Cronbach’s $\alpha$ reliability coefficients ranging from 0.69 (confusion–bewilderment) to 0.93 (vigour–activity) for mothers and from 0.70 (vigour–activity) to 0.96 (depression–dejection) for fathers.

#### Parental and infant characteristics

We collected the following parental characteristics: age (years), type of delivery (vaginal or caesarean), number of child, type of delivery, offspring order, multiple births (multiple or singleton), and education level (less than high school, high school, or more than high school). We either recorded the information at the time of the assessment or obtained it through medical records.

We collected the following infant characteristics: GA (weeks), birth weight (grams), 1-min Apgar scores, 5-min Apgar scores, length of respiratory support (hours), and intubation (yes or no). We obtained this information from medical charts.

### Analysis

We analysed the data with SPSS Statistics 20.0. To compare maternal and paternal stress levels and negative feelings immediately after the premature births of their children, we used a paired sample $t$-test. Moreover, we performed a repeated-measure analysis of variance to compare the parents’ scores on both the PSS: NICU and POMS subscales.

We determined the extent to which particular factors influenced maternal stress and feelings by considering the following

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**Table 1. Parental and infant characteristics**

| Parental characteristics | Maternal age (years) | $M = 35.93; SD = 5.99; range = 21–49$ |
|--------------------------|----------------------|-----------------------------------|
| Maternal level of education | $<$High school | 7.9% |
|                          | High school | 26.3% |
|                          | $>$High school | 65.8% |
| Paternal age (years)     | $M = 39.91; SD = 6.35; range = 27–54$ |
| Paternal level of education | $<$High school | 38.7% |
|                          | High school | 12.9% |
|                          | $>$High school | 48.4% |
| Pregnancy characteristics | Type of delivery | Vaginal 5.7% |
|                          | Caesarean | 94.3% |
| Offspring order of the preterm | First | 41.2% |
|                          | Second | 52.9% |
|                          | Third | 5.9% |
| Multiple births          | Singleton | 54.5% |
|                          | Multiples | 45.5% |
| Infant characteristics   | GA (weeks) | $M = 30.42; SD = 2.79; range = 24–35$ |
|                          | Birth weight (grams) | $M = 1301.89; SD = 432.62; range = 477–2200$ |
|                          | 1 min Apgar scores | $M = 6.27; SD = 1.46; range = 1–10$ |
|                          | 5 min Apgar scores | $M = 8.25; SD = 0.86; range = 6–10$ |
|                          | Respiratory support (hours) | $M = 20.32; SD = 25.52; range = 0–95$ |
|                          | Intubation | Yes 27.5% |
|                          | No | 72.5% |

*Note: Sample size – mothers: $n = 43$, fathers: $n = 38$.*
Results

Maternal and paternal stress levels and negative feelings

We found significant differences between mothers’ and fathers’ stress levels, as measured by PSS: NICU. In particular, mothers obtained higher level of stress compare to fathers both in the three subscales (sights and sounds, infant behaviour and appearance, and parental role alteration) and in the total stress score. Considering the presence of negative feelings measured by POMS, we found that mothers had higher scores than fathers in the tension–anxiety and depression–dejection subscales. No further significant differences were found. These findings are summarized in Table 2.

Comparing the PSS: NICU maternal subscale, we found some significant differences ($F = 46.13; P < 0.001$). For mothers, stress levels related to alterations in the parental role were significantly higher than those related to either the infant’s behaviour and appearance ($P < 0.001$) or NICU sights and sounds ($P < 0.001$), and those related to the infant’s behaviour and appearance were significantly higher than those related to NICU sights and sounds ($P = 0.017$). For fathers’ scores on the same scale, we also found significant differences; in particular, fathers’ stress levels related to alterations in the parental role were significantly higher than those related to NICU sights and sounds ($F = 4.89; P = 0.016$). We found no significant differences within the POMS subscales for either mothers or fathers.

Predictors of stress levels and negative feelings

Significant predictors of both maternal and paternal stress levels are shown in Table 3. For mothers, the time that their babies spent on respiratory support was a significant predictor of stress related to NICU sights and sounds, and maternal age was a significant predictor of stress related to alterations of parental roles. In particular, younger mothers reported higher stress levels.

For fathers, paternal age was a significant predictor of stress related to NICU sights and sounds. In particular, younger fathers reported higher stress levels. Moreover, the 1-min Apgar score was a significant predictor of paternal stress related to infant and behaviour and appearance, and the 5-min Apgar score was a significant predictor for increase stress related to the alteration of parental role and total stress. We found no significant predictors for the presence of negative feelings in mothers, despite what we found for fathers.

Table 2. Descriptive statistics and paired t-test results for the study variables in mothers and fathers

|                           | Mother’s score (n = 43) | Father’s score (n = 38) | M (SD) | M (SD) | P     |
|---------------------------|------------------------|------------------------|--------|--------|-------|
| **PSS: NICU**             |                        |                        |        |        |       |
| Total score               | 9.06 (2.46)            | 6.95 (1.91)            | 0.001  |        |       |
| Sights and sounds         | 2.49 (0.73)            | 2.04 (0.523)           | 0.010  |        |       |
| Infant behaviour and appearance | 2.79 (1.01)         | 2.29 (0.740)           | 0.040  |        |       |
| Alteration of parental role | 3.78 (0.952)         | 2.64 (1.11)            | 0.000  |        |       |
| **POMS**                  |                        |                        |        |        |       |
| Total score               | 308.92 (44.42)         | 292.32 (41.85)         | NS     |        |       |
| Tension–anxiety           | 53.76 (11.92)          | 48.76 (9.81)           | 0.032  |        |       |
| Anger–hostility           | 51.47 (12.02)          | 47.89 (12.32)          | NS     |        |       |
| Fatigue–inertia           | 54.45 (9.57)           | 51.03 (9.61)           | NS     |        |       |
| Depression–dejection      | 49.58 (8.74)           | 45.13 (8.40)           | 0.011  |        |       |
| Vigour–activity           | 49.18 (11.02)          | 53.58 (8.65)           | NS     |        |       |
| Confusion–bewilderment    | 50.47 (11.35)          | 48.24 (10.81)          | NS     |        |       |

Table 3. Risk factors for maternal and paternal stress level measured by PSS: NICU

|                           | $R^2$ | $B$        | P     |
|---------------------------|-------|------------|-------|
| **Maternal stress level** |       |            |       |
| Sights and sounds         |       |            |       |
| Respiratory support       | 0.224 | −0.013     | 0.044 |
| Alteration parental role  |       |            |       |
| Respiratory support       | 0.391 | −0.025     | 0.003 |
| Maternal age              | 0.367 | 0.055      |       |
| **Paternal stress level** |       |            |       |
| Sights and sounds         |       |            |       |
| Paternal age              | 0.395 | −0.062     | 0.021 |
| Infant behaviour and appearance |       |            |       |
| 1 min Apgar scores        | 0.344 | −0.187     | 0.035 |
| Alteration parental role  |       |            |       |
| 5 min Apgar scores        | 0.372 | −0.566     | 0.027 |
| **Total stress**          |       |            |       |
| 5 min Apgar scores        | 0.441 | −1.00      | 0.021 |

Note: Sample size – mothers: $n = 43$, fathers: $n = 38$. 

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medical conditions prevent parents from immediately taking care of their newborn immediately after birth (Feldman et al., 1999; Goldberg and DiVitto, 2005; Axelin et al., 2010). As reported earlier, in the NICU where we conduct the study, initially, parents can only observe routine procedures on their infants; only once the baby’s condition has improved and when they feel ready, parents start to cooperate with nurses in the care of their infants. For this reason, we could infer that parents might feel powerless and helpless (Clotey and Dillard, 2013; Sansavini and Faldella, 2013) and, consequently, they might experience negative feelings such as anxiety, depression, anger, helplessness, and confusion (Müller-Nix and Ansermet, 2009). Moreover, as researchers have underlined, we found that mothers are more anxious and depressed than fathers (Zelkowitz et al., 2007; Lefkowitz et al., 2010).

Because these differences in terms of parents’ stress levels and negative feelings may depend on various risk and protective factors, in the present study, we also wanted to explore which factors cause stress and negative feelings in mothers and fathers after premature births. In the present study we would like to start to give further information to clinicians about parental risk factors. This attempt may be a very first step that could orient them to organize specific interventions for parents who have these particular characteristics so that they can deal with these events and support mothers and fathers as soon as possible.

Our exploratory findings suggest that preterm birth seemed to be particularly stressful for younger mothers and fathers. We can therefore hypothesize that for the younger parents in the current study, a lack of knowledge about what to do and what to expect provoked higher stress (Dudek-Shriber, 2004). Moreover, our results suggested that the mothers of infants who spent more time on respiratory support experienced more stress from the NICU environment. As researchers in previous studies have observed, the NICU can have a strong impact on mothers, such as by increasing their stress levels (Trombini, Surcinelli, Piccioni, Alessandroni, and Faldella, 2007). Fathers of children with lower GA and worse conditions at birth experienced higher stress levels and more negative feelings. These findings are in line with those of previous studies, in which extremely premature babies were shown to be physiologically unstable and less responsive to social interaction than were infants who were born later in pregnancy (Korja et al., 2012). In addition, extreme prematurity often resulted in a need for more medical equipment and a longer hospital stay to facilitate the infants’ development (Dudek-Shriber, 2004). Finally, it is important to underline that we did not find any factors that could predict the presence of negative feelings in mothers. As Lefkowitz et al. (2010) found, for mothers, the risk factors of loss of control, impairment of the normal routine, and fear of losing the child are more prominent than other factors; we did not investigate those factors in the present study.

In general, we could say that this study suggests the importance of paying attention to both parents’ experience in NICU immediately after the birth of their preterm child, and to factors that could potentially worsen this experience, leading parents to experience higher levels of stress and negative feelings. However, these results should also be read in the light of the limitations of this study. First, it is important to point out that our exploratory findings are taken from a limited sample size at a single NICU. An important next step would be to include more participants and new kinds of measures so as to better understand our results.

Additionally, we used a sample of volunteer parents without

| Table 4. Risk factors for paternal presence of negative feelings measured by POMS |
|------------------|--------|---------|
|                  | $R^2$  | $B$     | $P$    |
| Tension–anxiety  |        |         |        |
| 5 min Apgar scores | 0.251 | -6.157  | 0.011  |
| Multiple birth   | 0.374  | -6.551  |        |
| Paternal age     | 0.549  | -0.728  |        |
| Depression–dejection |     |         |        |
| GA               | 0.350  | -1.921  | 0.002  |
| Fatigue–inertia  |        |         |        |
| Intubation       | 0.515  | 11.469  | 0.000  |
| 5 min Apgar scores | 0.646 | -4.474  |        |
| Multiple birth   | 0.725  | -6.837  |        |
| Confusion–bewilderment |     |         |        |
| Paternal age     | 0.200  | -5.126  | 0.025  |

Note: Sample size – mothers: $n = 43$, fathers: $n = 38$
detecting possible differences between parents that decided to take part in our study and parents that refused to participate. Therefore, it may be possible that there is a selection bias. Participants’ responses may reflect their investment to better understand their situation. Further studies using a diverse and more representative samples will be necessary to better investigate the experience of those parents who do not decide to be assessed. Also, a longitudinal design would allow us to better understand whether factors such as parents’ stress and negative feelings after the preterm births of their children are linked with those children’s developmental outcomes.

In conclusion, our findings could be a starting point for helping primary care services to be more prepared to support parents following a preterm delivery in NICU. Raising awareness in practitioners involved in primary care services may help them to identify as soon as possible mothers and fathers who are at risk of severe responses and, consequently this could help them to provide adequate stress and negative feelings management interventions once they leave the hospital. As suggested by previous works, in order to prevent parents from experiencing stress and negative feelings after the premature births of their babies, it is essential to institute, as soon as possible specific interventions that reduce parental stress, decrease untoward responses, and improve both parental health and parenting behaviours (Maroney, 1994; Jackson et al., 2003; Opaririyakul et al., 2007; Aagaard and Hall, 2008; Arnold et al., 2013). Moreover, our findings may also help primary care services to be more prepared to give specific support to fathers of preterm babies (Lundqvist and Jakobsson, 2003; Pohlman, 2005; Candelori et al., 2017). In the current study we consider both the maternal and paternal points of view since we believe that both fathers and mothers of preterm infants equally need to be helped immediately after the childbirth and after the hospitalization period. Early family-centred interventions may be useful to prevent future difficulties in their relationship with infant and in child’s development (Ionio et al., 2018). Our results could stimulate nurses and other healthcare practitioners to take into account those factors that may impair the transition to parenthood after preterm birth, both for mother and for fathers. Particularly, our findings suggested that preterm birth is particularly stressful for younger parents that have preterm babies with low GA and that need respiratory support in the NICU. The current work may be a starting point to identify parents at risk. Further investigation will be necessary to better clarify which risk factors lead parents to experience higher level of stress and negative states that may be associated to the premature birth of their child.

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