



Preterm infant development, maternal distress and sensitivity: The influence of severity of birth weight



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ABSTRACT

Objective: To evaluate the influence of the severity of prematurity based on birth weight on maternal distress and sensitivity and on infant development.

Methods: Sixty-eight mothers and their preterm babies (30 babies classified into Extremely-Low-Birth Weight-ELBW and 38 into Very-Low-Birth Weight-VLBW) were assessed at 9 months of infant corrected age, using: Griffiths Scales for infant development, CARE-Index for maternal sensitivity during 5-minute of mother-infant interaction, and Parenting Stress Index-Short Form (PSI-SF) for maternal distress. Sixty-six healthy full-term infants (FT) and their mothers were assessed with the same procedure.

Results: ELBW, VLBW and FT groups showed similar levels at CARE-Index and PSI-SF. Nevertheless, considering infant development as outcome, a significant interaction between birth weight and maternal distress emerged, with higher Hearing & Language mean quotients in association with Non-Distressed mothers, but only in VLBW infants, compared to FT ones. Also the interaction between birth weight and maternal sensitivity influenced infant development: higher quotients (Eye-hand coordination, Hearing & Language, Locomotor) were significantly associated with sensitive mothers but only in ELBW infants.

Conclusion: The severity of prematurity, in interaction with the degree of maternal distress and sensitivity, influenced the level of infant development.

Practical implications: Taken together, these results suggest the relevance of considering severity of prematurity and maternal variables in order to implement appropriate interventions for supporting parenting role after a preterm birth and promoting an adequate infant development.

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1. Introduction

Prematurity, defined as birth before 37 weeks of pregnancy are completed [1], represents a severe risk for a delay in babies' later developmental outcomes, especially in cognitive and motor development [2–5].

Literature has highlighted that this risk is particularly evident when preterm infant birth weight is <1500 g (Very Low Birth Weight-VLBW) or <1000 g (Extremely Low Birth Weight-ELBW) [6], especially in the case of detection of neuropsychological delays, as evidenced by Lind et al. [7]. The VLBW and ELBW categories also represent the criteria used for premature infant inclusion and participation in clinical follow up in the Italian context [6,8]. For these reasons, the severity of prematurity based on birth weight may be considered a relevant variable for the research on preterm infant development and clinical intervention. Notwithstanding this, the birth weight has not sufficiently considered in

the literature, also in terms of its influence in the brief and long term after childbirth.

Prematurity also represents a potential risk for preterm infants' mothers: often perceived as a traumatic experience, preterm birth may cause an increase in parenting distress, which is characterized by the caregiver perception as not being able to cope with the demands of the situation [9–12]. During hospitalization, the need to delegate treatment to the medical staff may contribute to the weakening of the maternal perception of their own parental skills [13]. Besides, preterm birth may impair the maternal ability to detect and respond to infant cues and maternal competence [12,14,15]. After discharge, taking care of a preterm baby may represent a difficult experience, especially in the case of VLBW and ELBW infants, which are described, as less responsive and involved in the interaction with their mothers, with less vocalizations, eye contact and more negative emotions [15–18] compared to full term ones. As a consequence, many authors [15,19,20] reported how preterm infants' mothers have difficulties in interacting in a sensitive way with their infants (i.e. the ability to perceive and interpret the child's needs and to give a prompt and adequate response) [16]. Maternal sensitivity should be monitored for its influence on later

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development of full-term [21] and especially preterm infants [22]. Forcada-Guex et al. (2006) [19] showed that preterm infants reach adequate levels of development when their mothers were sensitive during interactions. However, it is worth noting that only few studies deepened this topic considering also the severity of prematurity based on infant birth weight [8,23].

So, the present study is aimed at investigating the role of infant birth weight on maternal variables at 9 months of corrected age, which would correspond to the end of preterm infant's first year [24]. This particular period was chosen because it represents an important step both for infant development, according to the growth of fine-motor skills [25], and for the quality of mother-infant interactions, with an increase of moments of shared attention and triadic co-ordination [26]. Therefore, at 9 months dyads are supposed to strengthen the skills learned in previous months and adjust them according to the new developmental tasks.

First, we analysed if the severity of prematurity, based on birth weight influenced: first, the degree of maternal distress and of sensitivity, considered separately; secondly, the level of infant development. Finally, a third aim of the study was to explore if the interaction between the birth weight and any of these maternal variables was relevant in influencing the level of infant development.

2. Methods

The present study was part of a follow-up project which assessed preterm infant development from 3 to 24 months of corrected age. The study protocol was approved by the Ethical Committee of the Department of Psychology (University of Bologna).

All mother-infant dyads were recruited between March 2010 and December 2011 according to the following inclusion criteria: absence of infant chromosomal abnormalities, cerebral palsy, malformations and fetopathy; presence of maternal previous or present psychiatric illness and lack of fluency in Italian.

Seventy-four preterm infants with birth weight under 1500 g and gestational age < 32 weeks, hospitalized at the NICU of the Bufalini Hospital (Cesena, Italy) and their mothers were considered eligible for the study: among these, 6 mothers refused to participate. Therefore, a total of 68 dyads were included: according to their birth weight, 30 infants were included in the ELBW Group (birth weight under 1000 g) and 38 in the VLBW Group (between 1000 and 1500 g).

Sixty-six healthy term infants and their mothers (Full Term-FT group; gestational age > 36 weeks, birth weight > 2500 g) were recruited by a psychologist at the antenatal classes held in the same town. Each antenatal class was attended by 10–12 pregnant women at third trimester of pregnancy; approximately 30% in each group voluntarily accepted to participate in the study.

2.1. Procedure

At 9 months after birth (corrected age for preterm infants), a psychologist met all mother-infant dyads at the Laboratory of the Department of Psychology, University of Bologna.

During the assessment, each mother was asked to fill a written consent form, an individual questionnaire regarding maternal (age, education, marital status, parity) and infant information (birth weight, gestational age, gender, type of delivery, length of hospitalization). Also, a Parent Stress Index-Short Form (PSI-SF) [27] was given to the mothers. This self-report questionnaire measures parental distress, in relation to the perceptions of the difficulties associated to parental role, to the interaction with the child, and to infant behavioural characteristics. Thirty-six items are scored from 1 to 5 (the higher the score, the more severe the symptoms); a total score (range 36–180) is obtained by summing up all the scores. A cut-off score of 90 for the total PSI-SF (90th percentiles) is considered to screen a clinically significant level of distress (Distressed mothers) [21]. Globally, 22 (16%) women of the total sample resulted in the “Distressed mothers” group.

The level of infant development was evaluated by the Griffiths Mental Development Scales-Revised version (GMDS for 0–2 years) [25,28], widely used in the clinical follow-up of preterm infants in the Italian context [2,6,28]. GMDS-R assess 5 specific areas of child development (Locomotor, Personal-Social, Hearing and Language, Eye-Hand Co-ordination, Performance) and provide a General developmental Quotient (GQ), representing the mean score of the subscales. The scores are standardized for an expected value of 100 with SD of 16 for all the subscales and 12 for the General Quotient. All infants were assessed by psychologists who were trained at GMDS and blind to infant birth weight.

During the same assessment, 5 min of free mother-infant interaction were video-recorded and later coded according to the Child-Adult Relationship Experimental Index (CARE-Index) [29] by one of the authors blind to the infant birth weight. CARE-Index is a method for evaluating the quality of parent-infant interaction. Key concept of CARE-Index is maternal sensitivity, defined as “any pattern of behaviour that pleases the infant and increases the infant's comfort and attentiveness and reduces its distress and disengagement” [29]. CARE-Index procedure requires that parents freely play with their infants, using a standard set of toys. Seven aspects of interactional behavior (facial expression, verbal expression, position, affection, turn-taking, control and choice of activity) were evaluated and contributed to scores on three scales for parents (Sensitive, Controlling and Unresponsive) and on four scales for infants (Cooperative, Compulsive-Compliant, Difficult and Passive). For each of the seven aspects two points were allocated, either both on one scale or split between two scales, with a total of 14 points, separately for the parent and the infant. The higher the parental sensitivity and infant cooperative scores, the more optimal the interaction. In particular, the maternal sensitivity continuous score can be computed in categorical variables [30,31]: 11 points or higher identify “sensitive” dyads, 7–10 points “adequate” dyads, 5–6 points “inept” (need for parental education), 4 or lower “high risk” range (severe lack of sensitivity). In accordance with our research questions and to avoid redundancy in the analyses and an over-fragmentation of the sample, we chose to use the distinction of Non-Sensitive (cut off ≤ 4) versus Sensitive (score ≥ 5). In the present study, 38 women (27.94%) of the total sample resulted “Non-Sensitive” mothers. Despite a high proportion of mothers scored in “Non-Sensitive” group, this frequency was consistent with a previous study regarding an high risk sample [32].

CARE-Index is widely applied and reliable in full-term populations and preterm infants, mostly VLBW [19,20,29]. However, to our knowledge, previous literature on CARE-Index regarding preterm dyads did not take in account different levels of severity of prematurity.

2.2. Statistical analyses

All statistical analyses were carried out using the IBM SPSS statistical package version 21.0.

Firstly, the homogeneity among ELBW, VLBW and FT groups, regarding socio-demographic and clinical variables, were explored through Pearson's Chi Square test and Univariate Anova.

According to our first aim, Pearson's Chi Square tests were carried out to explore if “Birth Weight” (ELBW, VLBW or FT) was associated with the following outcome variables: “Maternal Sensitivity” (Sensitive vs Non-Sensitive) and “Parenting Distress” (Non-Distressed vs Distressed).

According to our second and third aims, MANOVAs were used to investigate the influence of specific factors (“Birth Weight”, the interaction between “Birth Weight” and “Maternal Sensitivity” and the interaction between “Birth Weight” and “Parenting Distress”) on specific outcome variables (quotients at GMDS scales).

Significant results were considered when *p* values were lower than 0.05.

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