

Prematurity: parental stress, temperament and infant development

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The study was aimed at exploring the association between parenting distress, maternal perception of infant temperament and level of infant development when a preterm birth occurs. At 3 months of corrected age, 78 preterm infants and their mothers were compared with 73 term infants, using: *Parenting Stress Index-Short Form* (PSI-SF); *Italian Questionnaires of Temperament* (QUIT; 1-12 months); *Griffiths Mental Development Scales* (GMDS; 0-2 years). Results showed that preterm infants' mothers showed higher level of distress and perceived their infants as more difficult. Moreover, in GMDS preterm infants reported lower scores in Hearing-Language, Performance and General Quotients compared to full term ones. Significant predictors of higher maternal distress were preterm birth, lower infant Locomotor and Personal-Social development and perception of lower Positive Emotionality, higher Negative Emotionality. Preterm birth has a deeply stressful impact that can be exacerbated by the perception of the disparity between the demands of neonatal care and resources available.

Keywords: Preterm birth, parenting distress, infant temperament, infant development.

La prematuridad: el estrés paternal, el temperamento y el desarrollo del niño. El estudio explora, en el parto prematuro, la relación entre el estrés de los padres, la percepción maternal del temperamento del niño y el nivel de desarrollo del niño. Para la evaluación de una muestra de 78 niños prematuros a los 3 meses exactos de edad, en comparación con 73 nacidos a término, se han usado: *Parenting Stress Index-Short Form* (PSI-SF), para el estrés parental; cuestionarios italianos para el temperamento (QUIT, 1-12 meses), para el temperamento; las escalas de desarrollo mental de Griffiths (*GMDS*; 0-2 años), para el desarrollo del niño. Los resultados muestran que las madres de prematuro experimentan un estrés paternal significativamente mayor y sienten una reducción de la actividad motora en sus hijos, que tienen un menor nivel de desarrollo en la escala de Oído-Lenguaje, performance y cociente general. Los predictores significativos de estrés materno son los siguientes: nacimiento pre término, disminución en el desarrollo locomotor y personal-social y la percepción materna de una alta emocionalidad positiva y una baja emocionalidad negativa. El nacimiento prematuro tiene un profundo impacto estresante en las madres, agravado por la percepción de la disparidad entre las exigencias de la atención neonatal y los recursos disponibles.

Palabras clave: Prematuridad, estrés de los padres, temperamento del niño, desarrollo infantil.

Preterm birth that occurs before the 37th week of gestation represents an important perinatal health problem as it is one of the main causes of neonatal morbidity and death (Beck *et al.*, 2010). The condition places the newborn at risk as to reaching the development phases; this owing to the immaturity of the biological systems, of the diseases present at birth (pulmonary difficulties; necrotizing enterocolitis (NEC); infections; retinopathy; cardiac lesions) and treatment required (Vanderbilt & Gleason, 2011). In the past decades, the gradual increase of preterm births and of neonatal survival for infants increasingly smaller for weight and gestational age (GA) has increased the probability of emotional distress for parents and of negative development sequences for the child (Claas, Bruinse, van der Heide-Jalving, Termote & de Vries, 2010; Tamaru *et al.*, 2011).

The traumatic nature of preterm birth, joined with the precarious conditions of endangered life for the infant and of his vulnerable appearance, unreactive and listlessness (Negri, 2012), causes in parents, particularly in the mother, painful emotions of fear, anxiety, depression, hostility, shame, failure and stress (Brooten, Gennaro, Brow & Butts, 1988; Miles & Holditch-Davis, 1997; Tu *et al.*, 2007; Trombini, Surcinelli, Piccioni, Alessandrini & Faldella, 2008; Holditch-Davis *et al.*, 2009; Shaw *et al.*, 2009; Zekowitz, Papageorgiou, Bardin & Wang, 2009; Vigod, Villegas, Dennis & Ross, 2010; Monti, Agostini & Neri, 2013). The mother's cognitive and emotional responses, her feeling of being unable to adequately cope with the demands of the situation express the acute reaction to the trauma of preterm birth. Within this context, moreover, the precocious separation from the infant and the need to delegate treatment to the medical staff constitute an obstacle for interactively co-building and for taking on the parental role and function blocking the need and the desire to touch the infant and take care of him (Tessier *et al.*, 2003). Therefore, for the mother it becomes difficult to relate and interact with the infant, particularly during the first period after birth (Niven, Wisznirwksi & Alroomi, 1993), also because the traumatic interruption of the pregnancy underlines more acutely the discrepancy between the maternal representations that were created during the period of gestation and the post-birth reality.

The mother's emotional state influences the perception the woman has of the newborn (Voegtline, Stifter & The Family Project Investigators, 2010), with harmful consequences on the elaboration of the trauma constituting a risk factor both for the persisting distress in subsequent phases (Carter, Mulder, Bartram & Darlow, 2005), as well as for the development of a secure attachment system.

Maternal symptoms explain a significant part of parental stress (Sheinkopf *et al.*, 2006), defined by Abidin (1995) as the disparity between parenting demands and resources perceived as available for meeting such demands. Literature in fact has documented significantly higher stress levels in mothers and fathers of preterm infants compared to those of parents of full term infants, from the moment of birth until the

child's first years of life (Brummelte, Grunau, Synnes, Whitfield & Petrie-Thomas 2011; Treyvaud *et al.*, 2011; Huhtala *et al.*, the PIPARI Study Group, 2011). Maternal psychological distress is often associated with the infant's vulnerability and to his weak behavioural signs, to the perception of the altered parental role and to the NICU (Neonatal Intensive Care Units) (Trombini *et al.*, 2008; Matricardi, Agostino, Fedeli & Montiroso, 2013). Moreover, it is associated with reduced regulatory capabilities of the preterm infant at 6 months and with a greater negative reactivity at 12 months of corrected age (Olafsen *et al.*, 2008). However, most of the studies focused on the moments immediately following the preterm birth and/or after the first year of life; very few studies were conducted the first months after the newborn was discharged from the hospital (Miceli *et al.*, 2000; Lutz, Burnson, Samuelson, Maleck & Poehlmann, 2012), an extremely delicate period for the parent-child relationship (Newnham, Milgrom & Skouteris, 2009), in which the absence of an adequate support system can favour the persistence of stress and its negative consequences (Matricardi *et al.*, 2013).

Regarding the preterm infant's temperament, studies have revealed that the instability of autonomic, motor and self-regulatory systems creates greater risks for those infants born prior to the 32nd week of gestation to greater behavioural disorganization that is manifested with lower stimulation and with greater negativity compared to full term infants (Voegtline *et al.*, 2010). In fact, in maternal relations, preterm infants are often described as being difficult children as they are less regular, less adaptable and more negative during communication exchanges (Halpern, Brand & Malone, 2001; Hughes, Shults, McGrath & Medoff-Cooper, 2002; Weiss, Jonn-Seed & Wilson, 2004). The perception of a difficult infant temperament is significant with relation to a reduced sense of parent self-effectiveness (Spielman & Taubman-Ben-Ari, 2009), so that the parental stress level appears associated with both the parents' characteristics as well as the perception of the infant's temperament (Singer *et al.*, 1999; Tu *et al.*, 2007). It can be supposed that preterm birth with all it involves in terms of treatment, stress-pain, separation from parents, has determining effects on the development trend of preterm infant's temperament (Newnham *et al.*, 2009). However, in literature, results regarding the temperamental differences between preterm infants and full term ones are contrasting: this can be connected both to the trend to resorting to maternal self-reports as an evaluation tool, both to heterogeneity and the numerous cases considered (Olafsen *et al.*, 2008). The literature does not sufficiently examine the effect of variables specifically pertaining to prematurity –gestational age, birth weight, and medical complications– on temperamental characteristics. Considering the major frequency of behavioural problems in the preterm birth population (Bhutta, Cleves, Casey, Craddock & Anand, 2002), it is a sustainable hypothesis that neonatal experiences create their effects already at an early age, during the formation of the temperamental characteristics.

In particular, the first three months of life constitute an important development phase for conquering psycho-motor abilities and emotional balance (Brazelton & Greenspan, 2001) and also represent a crucial period for establishing the mother-infant relationship.

This study intends to explore the connections that exist between maternal parenting stress, perception of the temperament and the level of infant development at 3 months of corrected age on a sample of preterm infants compared to full term ones.

Specifically, it is hypothesized that mothers of preterm infants show greater stress and higher perception of infant difficult temperament and that their child presents a reduced level of development. It is also hypothesized that this perception of the temperament and the reduced development level, jointly with the preterm birth, are indications of a greater parental stress.

METHOD

Participants

During the period between April 2009 and February 2013, 151 infants and their respective mothers were examined. 58.3% infants (88) were males and 41.7% (63) were females. The experimental group (EG), recruited at the moment of discharge from the hospital [NICU, Bufalini Hospital (Cesena), head physician Prof. Augusto Biasini], includes 78 preterm infants, with GA \leq 32 weeks; the control group (CG) includes 73 full term infants (GA \geq 37 weeks), whose mothers were recruited at the Family Counseling Unit [Consultorio Familiare AUSL, Distretto Cesena-Valle Savio (Cesena), referent Dr. Fabio Sgrignani] (Family Counseling Unit). The inclusive criteria for both groups were the absence of serious neonatal complications (cerebral palsy, chromosome malformations, etc.) and of maternal psycho-pathology; adequate knowledge of the Italian language in the mothers was required.

Procedure

At the age of 3 months (corrected age for preterm babies), the two groups were asked to come to the our Laboratory [Laboratorio di Psicodinamica dello Sviluppo "Anna Martini" (referent prof.ssa Fiorella Monti), School of Psychology, University of Bologna], where a psychologist (N.E.) administered the development scales and the mothers were given a booklet containing the questionnaires in a pre-stamped envelope, with the request to fill it out at home and mail it back within 15 days.

Measures

Clinical and socio-demographic variables. At the time of recruitment, the mother filled out a form regarding the socio-demographic variables (age, education,

marital status, parity, spontaneous abortion) as well as infant clinical information (gender, GA, birth weight, type of birth).

Parenting Stress Index-Short Form (PSI-SF) (Abidin, 1995). The short form of the *Parent Stress Index* (Abidin, 1995) is a self-report questionnaire aimed at measuring the stress experienced in the relationship with the child. It includes 36 items, with answers on the 5 points Likert scale and its total points are between 36-180, where the highest points indicate a higher parenting stress. The PSI-SF is divided into 3 sub-scales, each one comprised of 12 items: Parental Distress (PD), that measures the parenting stress linked with bio-psychological-social factors; Parent-Child Dysfunctional Interaction (P-CDI), that evaluates the stress perceived in the interaction with the child; Difficult Child (DC), relative to the stress linked to infant behavioural characteristics. The Italian version of the questionnaire demonstrated having adequate psycho-metrical indicators (Guarino, Di Blasio, D'Alessio, Camisasca & Serantoni, 2007).

Questionari Italiani del Temperamento (QUIT) (Axia, 2002). This is a self-report questionnaire validated with reference to Italian culture, aimed at measuring the infant's temperament between 1-12 months. Formed by 55 items subdivided into 6 temperamental areas (Motor Activities, Attention, Inhibition to Novelty, Social Orientation, Positive Emotionality, and Negative Emotionality) whose polarization between "high" and "low" indicates a positive or negative attitude toward the environment. It has a good level of reliability calculated according to Cronbach's α whose value is superior to .60 in every area.

The Griffiths Mental Development Scales (GMDS 0-2) (Griffith, 1996) measure the child's mental and psychological-motor development in 5 areas providing relative quotients: Locomotor, Personal-Social, Hearing and Language, Eye and Hand Coordination, Performance. The General Quotient (GQ) represents the average of the points in each area. The single points are standardized in quotients with an average of 100 and DS 16 for the scales and 12 for the GQ. Points lower than 70 are a sign of a serious developmental delay (Gianni *et al.*, 2007).

Data were analyzed using the 19 version of the *Statistical Package for Social Sciences* (SPSS). For all analyses conducted, the value of significance considered was of 0.05.

RESULTS

Sample's Descriptive Characteristics

The sample's descriptive characteristics were reported in table 1.

The two groups are homogeneous regarding the infant's gender ($\chi^2_{(1)}=0.03$; $p=0.85$) and the maternal variables: age ($F_{(1, 148)}=0.12$; $p=0.72$); level of education

($\chi^2_{(1)}=3.09$; $p=0.37$); marital status ($\chi^2_{(1)}=0.32$; $p=0.56$); spontaneous abortion ($\chi^2_{(1)}=0.35$; $p=0.55$).

There are significant differences between the two groups referring maternal parity ($\chi^2_{(1)}=4.2$; $p=0.03$), but univariate ANOVA did not underline a significant influence on the dependent variables and it was deemed adequate to consider an overall homogeneity and comparability of the two samples. Significant differences emerged only on the bases of GA ($F_{(1, 148)}=1565.78$; $p<0.0005$), birth weight ($F_{(1, 148)}=1363.90$; $p<0.0005$), type of delivery ($\chi^2_{(1)}=31.7$; $p<0.0005$), expected differences since variables are strictly associated with the preterm birth.

Table 1. Descriptive characteristics of the two groups

	EG (n=78)	CG (n=73)	p	
	GA (weeks), m±SD	28.74±2.09	39.91±1.18	< 0.0005
	Birthweight (grams), m±SD	1094±277.23	3428.68±477.90	<0.0005
Infant Variables	Gender, N (%)			
	Male	46 (59.0)	42 (58.3)	0.85
	Female	32 (41.0)	31 (41.7)	
	Age (years), m±SD	33.38±5.66	33.07±5.08	0.72
	Education, N (%)			
	Primary School	1 (1.6)	0 (0.0)	
	Secondary school	16(21.3)	10 (13.9)	0.37
	High school	44 (58.7)	43 (59.7)	
	University	14 (18.7)	19 (26.4)	
Maternal Variables	Marital status, N (%)			
	Married	56.8	52.1	0.56
	Other	43.2	47.9	
	Parity, N (%)			
	Nulliparous	31.2	16.7	0.03
	Multiparous	68.8	83.3	
	Previous abortion, N (%)			
	Yes	26.3	22.1	0.55
	No	73.7	77.9	
	Type of Delivery, N (%)			
Caesarean section	74.0	37.5	<0.0005	
Spontaneous	26.0	76.7		

Differences between the two groups

The presence of significant differences between the two groups regarding PSI-SF, QUIT and GMDS mean scores was analyzed by ANOVA. Table 2 indicates the mean scores and p-value.

The mothers of the experimental group, compared to those of the control group, presented significantly higher parenting stress in Total scores ($F_{(1, 148)}=5.760$; $p=0.018$) and in the PD scale ($F_{(1, 148)}=35.80$; $p<0.0005$). The DC scale scores instead were significantly higher in the control group ($F_{(1,148)}=8.202$; $p=0.005$).

Referring to QUIT, there was a significant difference in the points of Motor Activity that, which was lower in preterm infants ($F_{(1, 148)}=4.538$; $p=0.035$).

Compared to GMDS scales, the preterm infants obtained significantly lower mean scores in the following areas: Hearing-Language ($F_{(1,148)}=4.65$; $p=0.033$); Performance ($F_{(1,148)}=14.184$; $p<0.0005$); General Quotient ($F_{(1, 148)}=4.045$; $p=0.046$).

Table 2. PSI-SF, QUIT, GMDS mean scores in the two groups

		EG (n=78)	CG (n=73)	F	p
PSI-SF	Total score	62.88 ± 16.487	57.73 ± 8.35	5.76	0.018
	PD	22.24 ± 8.37	17.59 ± 4.64	35.80	<0.0005
	P-CDI	18.08 ± 5.04	17.75 ± 4.92	0.16	0.691
	DC	20.22 ± 6.00	22.38 ± 2.45	8.20	0.005
QUIT	Motor activity	3.25 ± .76	3.51 ± 0.73	4.54	0.035
	Attention	4.56 ± .65	4.70 ± 0.47	2.32	0.130
	Inhibition to novelty	2.40 ± .73	2.21 ± 0.71	0.11	0.109
	Social orientation	4.43 ± .59	4.42 ± 0.53	0.91	0.911
	Positive Emotionality	4.87 ± .06	4.90 ± 0.58	0.70	0.791
	Negative Emotionality	2.21 ± .58	2.21 ± 0.62	0.01	0.993
GMDS	Locomotor	112.86 ± 15.84	116.70 ± 11.10	2.93	0.089
	Personal-Social	103.18 ± 12.135	105.74 ± 10.20	1.96	0.164
	Hearing and Language	104.97 ± 11.00	108.90 ± 11.381	4.65	0.033
	Eye and Hand Coordination	110.51 ± 13.89	111.03 ± 15.671	0.05	0.831
	Performance	108.44 ± 12.78	115.58 ± 10.27	14.18	<0.0005
	General Development	107.58 ± 10.63	115.99 ± 35.26	4.05	0.046

Note: Values are mean ± standard deviation

Maternal Stress Predictors

For each level of maternal stress that was seen as being significant by univariate ANOVA (Total score, PD scale, DC scale), a Stepwise Linear regression was conducted using as predictors the infant development quotients (Locomotor, Personal-Social, Hearing and Language, Eye and Hand Co-ordination, Performance) and the perception of the infant's temperament (Motor Activity, Attention, Inhibition to Novelty, Social Orientation, Positive Emotionality, Negative Emotionality), with the objective of identifying the model capable of explaining the greatest percentage of variance. The preliminary regression analyses examined for each dependent variable the possible effect of the socio-demographic variables (mother's age, education, marital status, infant's gender, parity, level of education, previous abortion): none of these appeared to significantly contribute to the variation of the dependent variables being considered; consequently these factors were not included in the final model. The models that emerged from the Regression Analyses are reported in table 3.

Considering the total stress, the significant model emerged ($p<0.0005$), capable of explaining 22% of the variance (Adj $R^2=0.218$), includes the following significant predictors of a higher stress level: the preterm birth ($\beta=-0.194$; $p=0.016$), the maternal perception of low Positive Emotionality ($\beta=-0.321$; $p<0.0005$) and the high Negative Emotionality ($\beta=0.279$; $p=0.001$).

A significant model ($p<0.0005$) also emerged for the PD scale, where belonging to the preterm birth group ($\beta=-0.398$; $p<0.0005$), a low Locomotor

development quotient ($\beta=-0.227$; $p=0.003$), the maternal perception of low Positive Emotionality ($\beta=-0.342$; $p<0.0005$) and high Negative Emotionality ($\beta=0.195$; $p=0.008$) predict a high level of maternal stress connected with one's own parenting role explaining for 36% of the variance ($\text{Adj } R^2=0.362$).

In the DC scale, the significant model that emerged ($p=0.003$), capable of explaining 10% of the variance ($\text{Adj } R^2=0.103$), indicates that belonging to the control group ($\beta=0.226$; $p=0.01$), the high scores obtained by the infant in the GMDS Personal-Social Quotient ($\beta=0.181$; $p=0.048$) and the perception of low Positive Emotionality ($\beta=-0.273$; $p=0.010$) predict a higher stress level connected with the child's characteristics.

Table 3. Contribution of infant's temperament and development variables to maternal distress

Predictors	B	SE	β	<i>t</i>	<i>p</i>
Total score: $F_{(13, 124)}=12.509$, $p<0.0005$, $\text{Adj } R^2=0.218$					
Group	-4.672	1.909	-0.194	-2.448	0.016
QUIT: Positive Emotionality	-6.196	1.542	-0.321	-4.019	<0.0005
QUIT: Negative Emotionality	5.578	1.593	0.279	3.502	0.001
PD scale: $F_{(13, 124)}=15.092$, $p<0.0005$, $\text{Adj } R^2=0.362$					
Group	-5.507	1.004	-0.398	-5.483	<0.0005
GMDS: Locomotor Quotient	-0.111	0.037	-0.227	-3.009	0.003
QUIT: Positive Emotionality	-3.810	0.955	-0.342	-3.988	<0.0005
QUIT: Negative Emotionality	2.248	0.833	0.195	2.699	0.008
DC scale: $F_{(13, 124)}=3.854$, $p=0.003$, $\text{Adj } R^2=0.103$					
Group	2.042	0.775	0.226	2.635	0.010
GMDS: Personal-Social Quotient	0.070	0.035	0.181	1.994	0.048
QUIT: Positive Emotionality	-1.989	0.758	-0.273	-2.625	0.010

Note: PD: Parental Distress; DC: Difficult Child.

DISCUSSION

The results that emerged in the total score and in the Parental Distress of PSI-SF confirm that, at 3 months of corrected age, the mothers of the premature infants undergo significantly higher parenting stress levels compared to those of full term infants; this is also confirmed in literature compared to later ages (Davis, Edwards, Mohay & Wollin, 2003; Lau & Morse, 2003; Carter *et al.*, 2005; Trombini *et al.*, 2008; Grunau *et al.*, 2009; Shaw *et al.*, 2009; Vanderbilt & Gleason, 2011). This result appears important with respect to the significance of each scale and to the specific nature of this study that focuses on a very early state of the preterm infant: it seems to highlight the importance of the mother's perception of herself as a failure parent and how the source of distress is mainly directed towards herself. It is likely that feelings of fear and uncertainty with respect to care capabilities can accompany the attempts to attend to the infant who is perceived as being vulnerable and needy together with the continuing concern regarding his/her health and wellbeing.

The results obtained can therefore indicate how during the first months of the infant's life parental distress is linked to a disparity between the demands made on the parent and the resources considered available for meeting such demand creating a series of negative effects that may impact the infant's development. A previous study conducted by Singer *et al.* (1999), indicated that the mothers of one month preterm infants suffer from a significantly higher stress level connected with their role compared to the ones of the control group, while at 1 and 3 years of age they reveal a high distress level connected with the child's characteristics perceiving the child as being more needy.

Regarding the temperament, the results obtained reveal a significant difference in the maternal perception regarding the extent of Motor Activities, indicating a minor vigor in movements and a reduced motor control for preterm infants, data that also emerged in pre-school age studies (Perricone & Morales, 2011a). This level can represent a significant area for such a small infant and is an important indicator of vitality that allows a parent to immediately assess his growth. For mothers of preterm infants, lower developmental levels and motor coordination could re-evoked the image of the newborn infant that was extremely fragile, suffering, immobile and uncoordinated.

Overall, preterm infants demonstrate a lower developmental level respect to full term infants with specific differences in the Hearing- Language and Performance areas of the GMDS, indicating that the two groups reveal a different pace in acquiring such skills. The large volume of literature on prematurity and its effects on child development focuses its attention on pre-school and school ages (Perricone, Scimeca & Maugeri, 2004), registering an increased vulnerability of preterm infants in the areas of linguistic development (Sansavini, Guarini, 2013) and significant differences with full term infants in scholastic learning (Walther, den Ouden & Verloove-Vanhorick, 2000; Perricone & Morales, 2011b). The developmental differences already noticed at 3 months require close monitoring since they could represent a predictive factor for subsequent difficulties, also considering that the sample analyzed refers to a population of healthy preterm infants who did not suffer from serious preterm complications.

The analysis of the regression revealed how being mothers of preterm infants represents a significant predictor of the stress level perceived, not only globally, but also specifically referred to parenting.

Belonging to the control group, instead, appears predictive of the maternal stress level connected with the characteristics of her own full term infant who is healthy and less vulnerable.

Another predictor of maternal stress levels both for the total points as well as for the PD scale was the perception of the infant's low Positive Emotionality and high Negative Emotionality: according to the QUIT, the combination of the two factors defines a difficult temperament that is a signal of the child's problematic adjustment to his environment and interaction difficulties (Axia, 2002). These connections do not

emerge on the Difficult Child scale where only low levels of Positive Emotionality contribute significantly to stress levels: this could be partly owned to the fact that in the PSI-SF, the definition of a difficult child focuses mainly on the infant's behavioural characteristics (Abidin, 1995), while in the QUIT, they focus on aspects connected to emotionality (Axia, 2002).

Overall, these results indicate that already at 3 months of corrected age, the association exists between perceiving a difficult infant temperament and maternal psychological distress. This aspect is also researched at later ages in preterm infants (Singer *et al.*, 1999; Halpern *et al.*, 2001; Jackson, Ternestedt, Magnuson & Schollin, 2007; Olafsen *et al.*, 2008; Vogletine *et al.*, 2010) and is in line with a recent study that uses PSI-SF at 4 months of corrected age to compare the stress between mothers of preterm infants and mothers of full term infants identifying a predictive effect of the perception of the infant's temperament on the stress level in both groups (Gray, Edwards, O'Callaghan & Cuskelly, 2012). Literature has often identified a difficult temperament in preterm infants (Weiss *et al.*, 2004), while also underlining the difficulty in generalizing results owing to the use of maternal self-reports, of heterogeneity that characterizes the preterm population and to the specific methods of the various studies (Kerestes, 2005).

Always regarding the models of regression that emerged, analyses demonstrated how the Personal-Social quotient that evaluates the child's capability of socially interacting through vision, smiling and vocalizing, contributes significantly to the scores of maternal stress in the Difficult Child scale. A very socially active infant who searches for, or continuously wants his mother's attention, can pose a difficulty in the first months after birth. The maternal distress in the Parental Distress instead is influenced by the Locomotor development partly reflecting the perception of a reduced motor activity in their infants on the part of preterm infants' mothers. Overall, parental stress level can be influenced in different ways and is specific to the single areas of infant development and to the maternal perceptions. The objective development level, however, assumes a minor role in predicting maternal stress that is strongly and predominantly influenced during the infant's first months of life by the perception that the mother has of the infant's temperament. This does not eliminate the important implications of the psychological distress for the child's development: the maternal distress in literature can interfere with the relationship leading the mother to demonstrate and express less warmth and sensibility; as a consequence it impacts negatively on the child's cognitive and behavioural capabilities (Singer *et al.*, 2003) as well as emotional coping (Dennis, 2006); it is also associated with symptoms that are both internalized and externalized during the infancy of preterm children (Miceli *et al.*, 2000; Lauchth, Esser & Schmidt, 2001; Tully, Arsenault, Caspi, Moffitt & Morgan, 2004).

Preterm birth profoundly and stressfully impacts mothers, the symptoms of which do not disappear during hospitalization, but as emerges from this study, persist over the course of the infant's first months of life (Grunau *et al.*, 2009; Huhtala *et al.*, 2011). The experienced stress that can persist during infancy (Grunau *et al.*, 2009; Huhtala *et al.*, 2011), can reach levels that can be diagnosed as post-traumatic stress disorder (DeMier *et al.*, 2000; Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex & Ansermet, 2003) in 24% of the new mothers, interfering profoundly on the interaction between mother and child, on carrying out parental functions (Monti *et al.*, 2013) and on the perception that the mother builds of her child. If the traumatic reality of prematurity is joined with damaged perceptions of the parental Self and of one's infant, this can cause the parental function to implode resulting in high levels of emotional distress and helplessness preventing the mistakenly perceived scenarios from being restored to their integrated nature (Monti *et al.*, 2013). The disturbed perinatal condition encounters parenting that is at risk (Monti, Fava & Agostini, 2005) and that requires support for coping with this sensitive period in a more competent and satisfactory way for the purposes of attachment and of emerging capabilities for regulating attention and emotions. Intervening at this level can prevent a negative development for the parent-child interaction system promoting a sense of self-effectiveness and resilience that appear compromised from the preterm birth experience and on which weigh heavily the sense of failure and impossibility of responding to the infant's needs during hospitalization as well as the anxiety of coping with a dangerous situation. Mothers with lower stress levels adapt more easily to the experience of parenting an infant that faces risks and interaction is characterized by greater synchronism and mutual attention, with possible positive repercussions also on the child's language development in later years (Newnham *et al.*, 2009).

The study therefore underlines that the focus of attention should regard not only the actual level of the child's development, but also and above all, the maternal experiences and perceptions that can influence parental distress following premature birth. Action should be aimed at helping the family cope with its needs and distress to succeed in perceiving themselves as parents of a child with normal and special needs: this can make the difference on the child's developmental outcome, on his health as well as that of all the family.

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