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PARENTING PRETERM INFANTS: IMPLICATIONS FOR MOTHERS AND MOTHER-INFANT RELATIONSHIP

Tutor: Prof.ssa CRISTINA RIVA CRUGNOLA

Tesi di dottorato di

MARIA SPINELLI

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a Iacopo

E all'improvviso la vita…

Cosa rappresenta veramente avere un bimbo prematuro?

Per noi genitori è difficile spiegarlo ed ancor più difficile da capire per chi non ha vissuto un esperienza di questo tipo. La maggior parte delle persone ignora i problemi connessi alla prematurità, le sue cause e le possibili conseguenze e talvolta anche la loro stessa esistenza. Spesso e volentieri noi genitori ci troviamo impreparati davanti a questa nascita improvvisa che neppure lontanamente avevamo pensato.

Nel mio caso il giorno della nascita di mia figlia è stato il momento in assoluto più bello della mia vita ma nello stesso tempo uno dei più drammatici. Diventare padre è una gioia infinita difficile da descrivere, è un fiume in piena di emozioni che non riesci a controllare e lì, di fronte a quella creatura indifesa, assapori a pieno il senso vero del dono della vita.

Quando però cominci a capire che la tua bimba è nata con troppo anticipo, con troppo poco peso e che non può condurre da subito una vita normale, un senso di profonda angoscia ti investe e cancella tutta la tua serenità.

Diversi medici circondano la tua piccolina e lottano contro il tempo per cercare di rianimarla e farla respirare. Dopo pochi istanti fili, tubi, aghi e sensori ricoprono il suo corpo e tu sei li che guardi incapace di alleviare questa sua sofferenza. Fino a quando senti pronunciare una parola che in terapia intensiva ho imparato da subito ad apprezzare: "stabile".

A questo punto comincia la tua vera battaglia come genitore e per affrontarla devi veramente scavare in fondo a te stesso per riscoprire e ritrovare qualcosa che da anni non ascolti e non coltivi più ma che è l'unica cosa che ti dà la forza di affrontare ciò che hai di fronte: la fede. La frase più frequente che ti senti ripetere dal mondo esterno è: "Non preoccuparti crescono anche loro come gli altri bambini, poi recuperano".

Intanto tu pensi al tuo passerotto che la sera sei stato costretto a lasciare in reparto, nelle mani di persone capaci e volenterose, che però non sono le tue.

Pensi a quei settecento dieci grammi che sono in un'incubatrice e che durante i primi giorni continuano a calare fino a cinquecento trenta grammi. Pensi a quanto sei stato stupido a non prevedere, a non informarti di quest'eventualità.

Pensi a dove hai sbagliato, cosa ti è sfuggito, perché è successo. Cerchi d'informarti e di capire, anche se in ritardo, quali sono le difficoltà che ti si prospetteranno davanti. Ti assalgono sentimenti come la paura, l'angoscia, la tristezza. Ti senti assolutamente inutile ma devi sforzarti di ricordare che quello che un figlio vuole in ogni situazione è solo amore.

E allora fai l'unica cosa che puoi fare: stare vicino e far sentire la tua presenza, la tua voce a questa bimba che è ben diversa da quello che ti aspettavi .

Cerchi di ristabilire con lei un contatto che bruscamente si è interrotto. La sua venuta al mondo improvvisa l'ha catapultata in un ambiente freddo, fino allora sconosciuto, zeppo di rumori e luci che allarmano persino noi adulti, con la presenza di voci nuove. La mamma magari per giorni non può essere in terapia intensiva perché ferma a letto e lei non sente più la sua voce, il suo corpo che fino al momento della nascita è stato il filtro attraverso cui sentiva il mondo e che allo stesso tempo era il "suo mondo". (…)

Tutto ciò che fino a poco prima rincorrevi come fosse l'unica motivazione della tua vita crolla di fronte agli occhi della tua bimba che vedi per un ora al giorno attraverso un vetro e durante i giorni che passano lentissimi cominci a rivalutare molte delle cose e delle persone di cui ti sei circondato.

Il bimbo prematuro è un bimbo che ha una voglia di vivere e forza di volontà non comune. È un bimbo che ha dovuto lottare per respirare, per vivere e che t'insegna il coraggio eroico della vita.

Inevitabile dunque essere molto orgoglioso di questo "ragnetto" proprio perché è così essenziale.

Non hai avuto tempo di pensare al colore del fasciatoio o della carrozzina, lui sta pensando a come superare le sue difficoltà. E tutte le sue conquiste, magari normali e scontate per gli altri, per te sono eccezionali con il piacere di farti sentire un genitore speciale, "quasi fortunato".

Il papà di Alice

ABSTRACT

Prematurity and the associated neonatal complications are identified as risk factors that may bring psychological complications both for the baby's development and for the early mother-infant relationship. The birth of a preterm infant, the sudden end of the pregnancy, and infant's hospitalization, often represent stressful experiences for parents. Therefore, premature birth may affect parental perceptions and attitudes, thereby distorting parent-child interactions and relationship.

The present dissertation aims to examine the complex experience of parenting a preterm infant from a transactional perspective with a mixed method design. The theoretical framework integrates the transactional model of development, attachment theory and recent theories of infant research. Three studies, analyzing the phenomenon from different perspectives and using different methodological frameworks, are reported.

The first study qualitatively analyzed narratives of 30 preterm infant mothers. Mothers were interviewed during infant hospitalization on the experiences of pregnancy, delivery and infant recovery. The thematic analysis revealed three major themes relevant for mothers: The construction of maternal identity, The construction of the representation of the bond with the child; The relationship with the healthcare providers and external world.

The second study is a microanalysis of mother-infant's emotion regulation and play during free play interactions at 3 and 6 months of infant's age. Comparisons between 22 preterm and 20 full-term infant dyads revealed more differences at a maternal and dyadic level than at the infant's level. Mother-premature infant dyads presented a typical interactive style characterized by maternal overstimulation and the tendency to lead the interaction. These dyads showed more difficulties to adjust their interaction to infant's growth and more interactive risk indicators emerged at 6 months. The role of infant and maternal characteristics and maternal attachment models as protective and risk factors was explored.

The third study examined perinatal Post-Traumatic Stress Disorder and the levels of parenting stress in 156 mothers of full-term children and 87 mothers of preterm children. This study proposed a mediating role of PTSD symptoms between preterm/full-term birth and levels of parenting stress. The mothers were asked to complete a Web survey assessing perinatal PTSD symptoms, parenting stress and social support. The findings showed that mothers of preterm children experienced more post-traumatic symptoms and parenting stress than did mothers of full-term children. Levels of PTSD symptoms were higher for mothers with infants born at lower gestational age. The relationship between preterm/full-term birth and levels of parenting stress was mediated by PTSD symptoms. Moreover, the child's age moderated the association between maternal PTSD and parenting stress.

The discussions of the three studies are integrated in the final conclusions. Findings suggest that prematurity have implications for mothers' transition to parenthood and for the development of mother-infant relationship confirming the need to examine the phenomenon from a transactional perspective. Implications for preventive interventions are addressed.

Key words: *preterm birth, mother-infant interaction, maternal representations, perinatal PTSD, parenting stress*

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CHAPTER 1
INTRODUCTION

Preterm birth is a biologic event in which delivery occurs earlier than expected. According to the World Health Organization premature infants are defined as infants born before 37 completed weeks of gestation as compared to full-term infants born from 37 to 42 weeks (Fox, 2002; WHO, 1993). Gestational age is commonly calculated on the basis of the date of the mother's last menstrual period (DiPietro & Allen, 1991). This definition is distinct from "low birth weight" which describes infants with a birth weight below 2500 grams, and includes appropriate-for-gestational-age premature infants and small-for-gestational-age premature and full-term infants. The term "very low birth weight" (VLBW) infants refers to premature infants born at less than 1500 grams, while the term "extremely low birth weight" (ELBW) has been adopted to describe premature infants whose birth-weight is less than 1000 grams.

Different levels of prematurity according to the infant gestational age have been established. Preterm infants born between 28 and 32 weeks of gestation are considered very preterm and infants born before 28 weeks of gestation extremely preterm.

Into the Italian context the percentage of preterm births is of the 6.8%. Among these the 6.7% is composed by very preterm deliveries while the 93.1% of the other births occur between the 37^{th} and the 42^{nd} gestational weeks. Birth weights less than 1500 grams are observed in 1% of births and the 6.1% of newborns had a weight between 1500 and 2499 grams (Boldrini, Di Cesare, & Tamburini, 2009).

Advancements in medical knowledge, technical capacity, and practice modalities in perinatology and neonatology have decreased the risk of infant death after preterm birth during the past several decades (Alexander & Slay, 2002). The overwhelming majority of babies with access to the modern technology and medical techniques available in the Neonatal Intensive Care Units (NICU) now survive. Subsequently, low birth-weight and preterm delivery has become an increasingly common occurrence.

Prematurity and the neonatal complications associated with it are identified as risk factors that may bring psychological complications both for the baby's development and for the early mother-infant relationship.

That a child was born prior to term means that at the time of birth his/her central nervous system was not fully organized for sustaining itself in the extra-uterine environment. In this sense, prematurity is a condition that places a child at risk for failure to achieve the self-regulation required for autonomic functions. Preterm babies experience elevated risk for poor health-related and developmental outcomes during infancy and childhood (Aarnoudse-Moens, Weisglas-Kuperus, van Goudoever, & Oosterlaan, 2009; Anderson, Doyle, & the Victorian Infant Collaborative Study Group, 2003; Bhutta, Cleves, Casey, Cradock, & Anand, 2002; Brummelte, Grunau, Synnes, Whitfield, & Petrie-Thomas, 2011; Suttora & Salerni, 2012).

This infants' risk for dysregulation of attention and arousal (Aarnoudse-Moens et al., 2009), in turn, jeopardizes their ability to maintain an alert state and thus their ability to interact productively with the environment and consequently to learn (Caravale, Tozzi, Albino, & Vicari, 2005; Johnson, 2007).

The birth of a preterm infant, the sudden end of pregnancy, and the infant's medical complications and illnesses, often represent stressful experiences for parents. Even though neonatal problems may be viewed as temporary, parent-infant dyads who began their relationships under stressful circumstances may continue to experience greater interactive difficulties than those who did not experience this difficult beginning (Muller-Nix et al., 2004). Premature birth may affect parental perceptions and attitudes, thereby distorting normal parent-child interactions and relationships (Poehlmann, Schwichtenberg, Bolt et al., 2011; Stern, Karraker, McIntosh, Moritzen, & Olexa, 2005).

When a baby is born prematurely, serious, ongoing medical and physical complications may require hospitalization in the Neonatal Intensive Care Unit (NICU) for several days and sometimes months.

The general environment of the NICU is far from tranquil, with nurses bustling and chatting, bright lights, medical staff coming and going, and other parents visiting the infants. Infants are surrounded by and attached to a variety of intrusive medical technologies. In the early stages of treatment they are placed in "open plan cribs" covered with plastic or housed in incubators, comprised of a plastic box with holes in the side to allow access. The infants have many wires and tubes entering or attached to their faces and bodies. Numerous, and very often noisy, machines that display numerical or graphic data or deliver drugs or oxygen surround each infant. Although NICU's policy changed in the last decades and more attention is given

to parents and their relationship with the infant, limited access hours for parents are still present and the medical condition of babies requires that early contacts occur almost exclusively in the presence of professional caregivers (Talmi & Harmon, 2003).

Very early interactions between mothers and their preterm infants occur in this atypical environment, where, facing the possibility of the infant's morbidity and mortality, parents may experience emotional exhaustion and helplessness, and they may feel detached and uninvolved with the infant's care due to the limited possibility to stay with their baby (Black, Holditch-Davis, & Miles, 2009; Latva, Korja, Salmelin, Lehtonen, & Tamminen, 2008).

Even after the infant has been dismissed by the hospital, the transition from hospital to home care is a potentially stressful time for parents of preterm infants; parents must assume the total responsibility for an infant whose care has been previously managed primarily by others (Zanardo, Freato, & Zacchello, 2003). Mothers of preterm infants often show symptoms of depression and anxiety (Poehlmann, Schwichtenberg, Bolt, & Dilworth-Bart, 2009; Voegtline & Stifter, 2010), and the potentially traumatic experience of preterm delivery may lead to the emergence of Post-Traumatic Stress Disorder symptoms (DeMier et al., 2000; Kersting et al., 2004).

All of these factors could affect the development of early relationship between mothers and premature infants (Muller-Nix et al., 2004; Singer et al., 2003).

The aim of this dissertation is to explore the implications of prematurity for mothers and the development of mother-premature infant relationship over infancy.

This work has as theoretical frameworks (see Chapter 4.1) the transactional model of development and the recent elaborations of attachment theory and infant research (Bowlby, 1990; Sameroff, 2010; Sroufe, 1997; Stern, 1995; Stern & Bruschweiler-Stern, 1998; Trevarthen & Aitken, 2001; Tronick, 1989).

These models highlight the dynamics of the relationship between the child and the child's context as the primary motor for developmental change. The development is seen not only as a function of the individual and of the individual's environment and not of either alone, but also as a function of the reciprocal interaction between the individual and the environment over time. The characteristics of each individual shape his or her experience and reciprocally experiences shape the characteristics of the individual through the time.

Within these theories, the development of mother-premature infant relationship could be considered as a result of the interplay between infant characteristics, maternal characteristics and the contextual factors over time.

This work analyzes the complex and challenging experience of parenting preterm infants focalizing on its implications for mothers and for mother-infant relationship, under different points of view and in different time points of infant life. This contribution aims to provide better information to understand the phenomenon and to design more suitable interventions.

1.1 Chapters outline

Chapter 2. The recent literature on mothers of premature infants' transition to parenthood is reviewed. The way mothers live the complex experiences of the preterm delivery, of infant hospitalization and of infant hospital discharge is examined together with the effects of these experiences on her representational world.

Chapter 3. This chapter included a review of studies that examined preterm infant-mother interactions. Findings from studies that compared preterm and full-term groups are reported. According to the hypothesis that prematurity is more than a single risk factor, the role of other factors related to the infant, the mother and their complex relationship as predictors of the quality of mother-premature infant interactions is examined.

Chapter 4. The theoretical framework of this dissertation is illustrated together with the aims of the work and a description of the method and the procedure used. This is a mixed method research and the reasons why it was decided to use this approach are explained.

Chapter 5. The first study of this dissertation is a qualitative study that examined maternal narratives of the experience of preterm delivery and infant hospitalization.

Chapter 6. The second study is a quantitative study that examined premature infant-mother interactions at 3 and 6 months of infant's age. Comparisons with a full-term infant-mother group are conducted and the influence of infant and maternal variables on the quality of premature infant-mother interactions over time is investigated.

Chapter 7. The third study, a quantitative study realized with a Web-survey, had the aim to analyze the mediation role of perinatal Post-Traumatic Stress Disorder (PTSD) on the development of parenting stress in mothers of premature infants. The literature on PTSD and parenting stress in mothers of preterm infants is examined.

Chapter 8. In this chapter the conclusions from the three studies are integrated and implications for interventions are examined.

PART 1
LITERATURE REVIEW

CHAPTER 2
FROM PREGNANCY TO PARENTING PRETERM INFANTS: IMPLICATIONS FOR MOTHERS

It is well recognized that the pregnancy experience is a great turning point in the life cycle of parents, in which parents are faced with a number of adaptive and transformative tasks (Riva Crugnola, Spinelli, & Gazzotti, 2012). The woman, in particular, is required to transform her identity by integrating it with the new functions related to the maternal ability to care for, protect, empathize with and adequately respond to the difficulties of caring for the unborn (Ammaniti, 1992). To this extent, Daniel Stern (1995) articulated the process of psychological transformation that occurs during pregnancy, as a woman is preparing to become a mother. The new mother experiences a unique stage of life with a new set of tendencies, sensibilities, fantasies and wishes. Stern called this new organization of mental life "the motherhood constellation".

In a similar manner, Winnicott (1971) formulated the term "primary maternal preoccupation" to describe the mother's intense involvement during the early days before birth and in the weeks after birth. Primary maternal preoccupation in the mother provides a protective shield around the infant to hold and protect him/her.

For the mother who prematurely gives birth to a baby, there may be inherent vulnerabilities in this process of adaptation to motherhood. The event of a baby being born prematurely indicates that there is also prematurity in the developmental process of becoming parents; the parents are "hurled" into parenthood (Tracey, 2000). For parents, preterm delivery constitutes a sudden interruption in the process of building representations of the birth, child and themselves as parents. The motherhood constellation is seriously distorted, and the mother experiences a painful sense of loss in the separation from her baby before being psychologically and physically prepared.

This abrupt interruption of the typical transition to parenthood requires the mother to reorganize her own representations and abandon the ideal infant in favor of the real newborn, who is characterized by high medical and physical risks. The real baby is different from the

one that the mother has held in her mind during pregnancy. This makes the process of adapting her fantasies to the real baby more difficult and challenging (Palacio Espasa, 2004).

Premature birth derails the parent's ability to imagine the infant's future, makes the recent past of the pregnancy with its fantasies too painful to remember and captures the mother in the frightening and deceiving present (Stern & Bruschweiler-Stern, 1998).

To sum up the strain experienced by parents of premature infants is significantly higher than those of full-term infants because the experience of birth is often not adequately prepared for, is contrary to the parents' expectations regarding the birth of their child and requires that the parents cope with the stress of their infant's medical conditions and technologically intensive clinical environment (Miles, Funk, & Carlson, 1993; Miles & Holditch-Davis, 1997).

From a transactional perspective, the process of becoming a parent of a preterm infant is mutually influenced by the effect of preterm delivery on the mother and how the mother reacts to this particular stressful experience. Therefore, the birth and subsequent care of a premature infant may challenge and negatively affect the psychological health of the parents and their emerging sense of being effective parents (Holditch-Davis, Bartlett, Blickman, & Miles, 2003). In turn, this process influences the development of the mother-child relationship, the quality of the dyadic interactions and consequently, the child outcomes.

Maternal distress may place the child at a greater risk of developmental disturbances, such as feeding, sleeping and behavioral problems (Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex, & Ansermet, 2003). Furthermore, maternal distress after premature birth has an effect on the development of the attachment with the child (Meijssen et al., 2011).

A mother's ability to cope with the emotional stresses associated with the preterm experience may also vary individually. Several studies have focused on the relationship between maternal personal characteristics, demographic variables, personal resources and the mother's level of psychological symptoms after preterm delivery (Poehlmann et al., 2009).

Analyzing the experience of preterm delivery from a maternal perspective could assist clinicians to plan more efficient interventions with the aim of preventing the negative outcomes of prematurity.

2.1 The preterm delivery: The interruption of the representational process

Mothers who experienced preterm labor and delivery of a premature infant relate this time as a particularly stressful and negative period. Mothers also report being physically and emotionally unprepared for the delivery (Lupton & Fenwick, 2001; Padovani, Linhares, Pinto, Duarte, & Martinez, 2008). Lupton and Fenwick (2001) reported that mothers constantly referred to "not feeling like a mother", "not being prepared" for motherhood and feeling "distanced" from their baby.

The end of the pregnancy was sudden and unexpected, thus catching the woman off-guard. Black, Holditch-Davis, and Miles (2009) reported how mothers perceived that healthcare providers, not themselves, determined that the pregnancy was ending or must end and they had no real choice except to acquiesce to the decisions and plans of others.

When there is trauma associated with premature birth and the infant is hospitalized with a fear of death or damage, the mother's preoccupation with protecting the baby from harm, pain and discomfort appears to have failed. Mothers appear incapable of being their baby's protector. They may turn inward as they search for an explanation for the preterm birth and describe this as a sense of failure and inadequacy because they were unable to sustain their pregnancy to term (Brady-Fryer, 1994).

Typically after birth, preterm infants are quickly separated from their parents during their initial stabilization and transferred to the NICU. Often, the mothers have cesarean sections and protracted recovery periods. Separated from the reality of the birth, many mothers have awakened from general anesthesia fearing that the infant had died. The only method to see their infant after delivery is often in photographs (Black et al., 2009).

In this situation, separation from the infant is so stressful for the mothers that they often request early hospital discharges and place their own health at risk for the opportunity to be close to their infant.

Black and colleagues (2009) further reported that mothers differentiated between feeling love for the infant and the establishment of a bond between them. For some, the feeling of love that began in pregnancy was placed in a state of suspension after the birth until the baby's survival was more likely. Mothers recognized an absence of depth or significant attachment to the infant after birth that functioned to spare their feelings if the infant died. The authors

described how mothers occupied a liminal space in which love was present but deeper bonds that tied the infant to them and their extended social network were not yet established.

This non-normative transition to parenthood has been described as an "emotional crisis" that is typically characterized by feelings of loss and grief (Caplan, Mason, & Kaplan, 1965; Watson, 2010). Premature mothers spoke of their initial days of motherhood as highly traumatic and distressing, which is in stark contrast to the rosy images of joyous early motherhoods that pervade popular culture.

In general, mothers of premature infants expressed their sentiments and reactions with connotations predominately focused on negative emotions. Positive expectations, when present, refer principally to those related to the future growth, development and health of the baby (Padovani et al., 2008).

It is thought that the mother's ability to resolve her feelings of grief and loss surrounding the premature delivery may favorably affect the subsequent mother-child relationship and infant socio-emotional development. Shah, Clements, and Poehlmann (2011) demonstrated how maternal feelings of resolved grief, regarding the preterm birth experience, were associated with secure infant-mother attachment at 16 months; mothers who had resolved their grief regarding their infant's preterm birth were 2.9 times more likely to have a securely attached infant.

2.2 From parenting in the Neonatal Intensive Care…

When a baby is born prematurely, serious, ongoing medical and physical complications may require hospitalization in the NICU for days and occasionally months. Mothers must leave the hospital without their infants, which is not what they had envisioned during their pregnancy.

On admission of an infant to the NICU, parents are confronted with the critical-care environment and its associated demands. Consequently, the mother's mental health and overall well-being may be affected. According to Whitfield (2003), parents describe their time in the NICU as the worst major life event they have experienced.

Regardless of the reason for the early birth or hospital stay, disruption of the typical relationship between parents and their newborn, as it occurs during infant hospitalization, may adversely affect the emerging parent-child relationship, maternal attachment behaviors and

representations of the baby (Feldman, Weller, Leckman, Kuint, & Eidelman, 1999). The bond of love that mothers expect would come with giving birth is absent, as is the opportunity to interact with and freely touch and cuddle their infants. The difficulties in dealing with this forced separation from their child has been reported as stronger for first-time mothers in their construction of a mothering identity because experienced mothers at least had a previous firm identity as an "established mother" to help them cope (Lupton & Fenwick, 2001).

Furthermore, once parents have the opportunity to see their infant, many identify their infant's physical appearance and behavior as stressful. There is a great discrepancy between the mother's imagination and fantasies of her child and the premature infant born sick (Holditch-Davis & Shandor Miles, 2000). Parents perceive their infant as fragile and are apprehensive to approach the infant. Mothers of less healthy and more at-risk infants reported more negative conceptions regarding their babies (Hall, Kronborg, Aagaard, & Brinchmann, 2012; Padovani et al., 2008).

Meijssen, Wolf and colleagues (2011) reported that 50% of premature infant mothers described negative emotions concerning the first time they saw their baby, such as fear of how small the infant was and its bio-medical condition, and they expressed feelings of alienation. Of these mothers, 31% felt that the baby was not theirs.

According to Flacking and colleagues (2007), mothers reported that they had to "put life on hold" during infant hospitalization. By putting "life on hold", the mothers suppressed their feelings, such as fear that the infant might die, anger toward disrespectful staff, or shame regarding feelings of being rejected as a person or mother. This suppression of feelings during the period at the NICU led to profound emotional exhaustion. This exhaustion is in contrast to the social expectations to be "a happy new mother", and some mothers felt similar to misfits because they felt a breach between experienced and desired emotions.

The inability to predict or guarantee when events were going to occur led to feelings of uncertainty. The primary cause of the uncertainty for parents of premature infants is the understanding that their preterm infant's condition could change at any time. These parents are unable to predict the outcomes of events or situations. Watson (2010) described how this chronic anxiety associated with uncertainty influenced the parents' lives outside of the neonatal environment. When at home, the parents relied on the telephone to maintain contact with the NICU; however, when receiving telephones call at home, all parents identified with

the uncertainty they experienced when the telephone rang. Premature infant parents reported a rising anxiety associated with not knowing who was calling or why.

Previously exhausted by the care for a fragile infant, these parents experience the additional burden of parenting in the NICU environment that often represents an obstacle for parental presence and participation.

Infant supportive technologies shape the women's mothering experiences substantially. The child's medical condition and highly technological NICU environment demands expert knowledge, and the maternal participation and care often comes second to professional care of the child. The presence of the incubator signified a troublesome impediment for parents in establishing a physical and emotional relationship with their infants. Mothers marked time and infant progress by, for example, ventilator settings and oxygen requirements. Only with the decrease in the necessity of supportive technology the mothers could experience more freedom to interact with their infants and have fewer worries regarding extubation and overstimulation (Black et al., 2009; Hall et al., 2012).

Parents require support to develop a loving relationship with their baby; however, in the NICU, the primacy of medical interventions creates a task-oriented environment that occasionally overlooks relationship development. Mothers are unable to engage in loving, touching and bodily care of the infant and developing a close emotional connection or bond with him/her. This restriction in their interactions with their infant subsequently distressed the mothers who felt the inability to develop this bond (Lupton & Fenwick, 2001).

Parents do not participate fully in the care of their child. Mothers must become experts in interacting with their baby to feel as mothers, but in the NICU, early interactions occur almost exclusively in the presence of professional caregivers. Parents recognize the importance of the support received from neonatal nurses and they are thankful for the neonatal nurses' knowledge and special skills necessary to care for their preterm infant (Flacking, Ewald, & Starrin, 2007). However, some neonatal nurses' behaviors might exclude parents from interacting physically and psychologically with their preterm infant, thus reinforcing parental powerlessness. Parents were expected to behave in a certain manner and had to await direction from the neonatal nurse caring for their infant, which made them feel similar to invited guests. From the parent's perception, rather than facilitating parent-infant closeness and promoting the

development of parental sensitivity and attachment, some neonatal nurses appeared to use their control to limit parental involvement in their infants care (Watson, 2010).

In the face of these challenges, parents make extraordinary efforts to maintain relationships with their hospitalized babies. Lupton and Fenwick (2001) identified the significant long-term effect that negative and exclusionary neonatal nursing practices can have on developing relationships between mothers and their infants. Mothers engaged in several strategies to reclaim the role of mother, such as becoming familiar with the medical terms and equipment that were relevant to their infant's care, wanting to attempt to breastfeed, and wanting to immediately establish breastfeeding.

The combination of the physical setting and staff's intense involvement with the infant, coupled with limited opportunities for caregiving, may contribute to a sense that the staff has usurped the parental role (Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993).

This alteration in their parenting role while their infants are hospitalized is a major stressor for parents of preterm infants. Mothers perceive themselves as inadequate caregivers because they are unable to provide even the most basic needs of their sick infant (Padovani et al., 2008).

Parents of fragile infants require accurate information and obvious, open communication with hospital staff. However, parents often receive conflicting messages, face inconsistent approaches to the treatment, experience the effect of high staff turnover, and report misunderstandings and conflicts with professionals (Watson, 2010).

Parents frequently identify a necessity for support to cope with the stress of having a preterm infant. However, parents reported the stresses related to keeping family and friends informed of their infant, the attenuation of the support network during hospitalization and dependency upon others for help, for example, the transportation and care of other children (Meyer et al., 1993).

2.3 …to parenting preterm infants after hospital discharge

The transition between hospital and home care of the premature infant has been suggested as a further avenue for research to determine the extent to which the stress of premature birth continues once the infant is discharged. Mothers have to restart the process of "becoming a mother" in a new environment, at home with the infant (Hall et al., 2012). Preliminary

research suggested that this is another critical time in the experience of having a premature infant as parents finally assume complete responsibility for their child without the assistance of nursing staff and move from a highly controlled environment to one that is substantially less controlled (Feldman Reichman, Miller, Gordon, & Hendricks-Munoz, 2000).

The discharge criteria are based on infants health and don't take into consideration maternal readiness (Cappleman, 2004). For this reason after the infant's discharge from the NICU, is common for mothers to experience ambivalent feelings about being at home, which are expressed by "pendular swings", for example, between feelings of relief because they have the baby with them and feelings of emotional exhaustion, fear and worries for the baby's medical conditions (Flacking et al., 2007; Meijssen et al., 2011).

Some mothers described how they finally experienced their infants as becoming more their own. They could do with their infants things in a way they wanted to and they were able to use the things they had bought for them (Flacking et al., 2007).

In contrast other mothers attempt to fulfill the expectations of being a good mother by imitating the staff in the performance of their caretaking (Lindberg, Axelsson, & Ohrling, 2009). When this was not accomplished, feelings of being worthless and inadequate arose.

Mothers of premature infants' immediate concerns may center upon the well-being of their newborn infant, and they may also worry about the longer-term developmental consequences of preterm birth; moreover, they often have doubts about their own ability to care for their fragile new family member and to understand his/her cues (Flacking et al., 2007).

These negative feelings tend to reduce over time with a significant decrease in psychological distress and increase in parental efficacy from pre-discharge to 3 months later (Jones, Rowe, & Becker, 2009).

Support is needed to prepare parents to make a successful transition at home. Parents of preterm infants can experience lack of support the first weeks after coming home with their infant, therefore specialized support from neonatal nurses is desirable (Örtenstrand, Winbladh, Nordström, & Waldenström, 2001). For example Lindberg, Axelsson and Ohrling (2009) identified how parents who benefited from a videoconference support from medical staff after hospital discharge felt strengthened by having a link between the home and the NICU. Parents experienced videoconferencing as positive, which empowered them and gave them confidence in their new situation of being at home with their infant.

Despite their excitement in taking the infant home, mothers of premature infants reported that their experience was different from that of parents of healthy infants, whose homecomings are marked by celebrations and visits from friends (Black et al., 2009). They have to pay attention to not expose the baby to potential sources of infection, recognizing his extreme vulnerability. Consequently these mothers find their social network temporarily and strictly limited to close family members although more casual social ties are suspended.

Furthermore the opinion of others has an impact on maternal wellbeing after hospital discharge. Some mothers described how they gained confidence and felt pride when they were recognized as the mother or when other people remarked that their infant was "looking healthy" and "big". On the contrary, when mothers received negative remarks about their infant, as that he/she was ''so small'', they reported feelings of shame and they felt that they had to defend the infant (Flacking et al., 2007).

2.4 The role of social support for preterm infant mothers

It is well known that social support is crucial in order to recover psychologically from stressful traumatic events. Social support is an important coping resource that may reduce stress buffering effects (Eriksson & Pehrsson, 2002).

Social support has been found to be more critical for mothers of premature infants than for mothers of full-term infants, with a lack of both general and spousal social support found to predict maternal distress only for mothers of premature infants (Singer et al., 1996).

There are two types of support relevant for parents of risk newborns in the NICU: formal support, provided by healthcare workers, and informal support, provided by family and friends. Pinelli (2000) established that social support is necessary more often during the acute phase after the birth of a premature infant than at any other time during the experience. Especially medical and social information support appeared to be more needed during the first period of intensive care. Jones and colleagues (2009) reported that, after 3 months, parents of premature infants have adjusted and social support may be less critical. Parents perceived support from family and informal relatives as less helpful and they reported using coping by support more post-discharge than pre-discharge (Rowe & Jones, 2010). At 24 months perceived social support did not differ among the preterm and full-term infant mothers (Eisengart, Singer, Fulton, & Baley, 2003).

The level of support has an effect on maternal wellbeing. The increased perception of support from nursing staff resulted in a decrease of depressive symptoms (Davis, Edwards, Mohay, & Wollin, 2003). In addition satisfaction with support from their child's physician was correlated with better psychological functioning for mothers of very low birth weight infants 12 months post discharge (Feldman Reichman et al., 2000).

Weiss and Chen (2002) found that mothers of premature infants' perceived emotional support from family and friends was significantly related to her mental health and Pinelli (2000) found a strong relationship between social support from family and friends and stress for mothers and fathers of premature infants.

2.5 Preterm infant mothers' coping strategies

Certain maternal coping strategies are more effective than others in reducing parenting stress and psychological distress for mothers of children with serious medical conditions or developmental disabilities (Lazarus & Folkman, 1984).

Affleck and Tennen (1991) examined the coping strategies used by parents of premature infants during infant hospitalization and found that the most common coping strategies used were seeking meaning and mobilizing support. Greater use of avoidant strategies was associated with less positive mood at discharge whereas greater use of minimizing strategies was associated with more positive mood when taking the infant home.

Prior to hospital discharge mothers who appraised the situation as threatening, uncontrollable and stressful and less controllable by self and others reported more psychological distress (Jones et al., 2009).

Mothers of high-risk children were less likely to use withdrawal/avoidant coping, including denial, mental disengagement, and behavioral disengagement than mothers of full-term children (Singer et al., 2007). These coping strategies are characterized as efforts to avoid dealing with the reality of a problem or stressful events and are not adaptive especially for mothers of sick infants. As Feldman Reichman and colleagues (2000) reported, escape-avoidant coping had the strongest effect in enhancing psychological distress and decreasing accepting responsibility for parents of very low birth weight infants.

Fewer studies have examined parents' coping strategies post infant hospital discharge. Post hospital discharge parents appraised the situation as less threatening, uncontrollable and

stressful and more controllable by self than pre-discharge (Rowe & Jones, 2010). Eisengart and colleagues (2003) replicated Feldman Reichman and colleagues' (2000) findings at 24 months post-term. Greater use of avoidant and express emotions coping predicted greater maternal psychological distress for all mothers. Interestingly no significant main effects for infant medical risk or multiple birth, race, or social class on coping strategies has been reported (Eisengart et al., 2003).

2.6 Maternal psychological symptoms following premature birth

Maternal symptomatic wellbeing is of concern not only because of its disabling effects on a woman herself but also because it has been associated with infant cognitive, emotional and developmental delay (Murray & Cooper, 1999). Furthermore the premature birth is a condition perceived by mothers as extremely inductive to anxiety and expectations permeated with fear and ambivalent feelings (Padovani et al., 2008). Mothers are fearful of their baby's fragile appearance, often trying to cope with their baby's uncertain survival and the potential for long-term negative outcomes for their child.

Although all infants may be vulnerable to the effects of maternal depression and anxiety, the premature infant is at greater risk due to his/her decreased responsiveness and increased need for stimulation (Feldman et al., 1999; Schmucker et al., 2005). For example, preterm infants with more symptomatic mothers were most likely to be classified as insecurely attached to their mothers, whereas no direct relation between depressive symptoms and attachment was found for full-term infants (Poehlmann & Fiese, 2001a). Furthermore mothers with greater levels of anxiety and depression appear to be susceptible to reactions and feelings focused on negative/conflicting emotions, thus, comprising a situation of multiple risk which could have adverse effects for the mother, herself, and for the baby (Padovani et al., 2008).

Several studies explored specifically the relationship between maternal anxiety and depression and premature birth reporting higher levels of depressive and anxious symptoms compared to born at term infant mothers (Padovani et al., 2008; Vanderbilt, Bushley, Young, & Frank, 2009; Younger, Kendell, & Pickler, 1997; Zanardo et al., 2003) also longitudinally during the first years of infant life (Kersting et al., 2004).

Davis and colleagues (2003) reported the 40% of the mothers of premature infants exhibiting symptoms of depression, especially during the acute phase of hospitalization of the

baby, in comparison with the 15% of the normal population. Miles and colleagues (2007) reported even higher levels with more than half of the preterm infant mothers (63%) at risk of depression. Furthermore Miles and colleagues (2007) found that preterm infant mothers who reported more parental role alteration stress during hospitalization and more worries about the child's health were more likely to experience elevated depressive scores that put them at risk of depression.

At the same time a significantly higher occurrence of mothers with clinical indicators for anxiety and/or depression together was reported in samples of premature infant mothers. In Carvalho, Martinez, and Linhares' study (2008) 86% of the mothers reported clinical symptoms for anxiety focused on the situation of the premature birth of their child.

Comparing the period during hospitalization and after discharge of the infants, several studies reported a significant decrease in the portion of mothers exhibiting emotional clinical indicators and a further decrease was verified at the end of the first year of infant's life (Carvalho, Martinez, & Linhares, 2008; Holditch-Davis et al., 2009; Miles, Holditch-Davis, Schwartz, & Scher, 2007; Schmucker et al., 2005). At 2 years only high risk infant mothers reported more psychological symptoms than the comparisons, difference that was not anymore present by 3 years of infant's age (Singer et al., 1999).

Infant variables appeared to influence the level of maternal distress. Mothers whose babies had lower birth weight, lower gestational age, greater neonatal risk and longer hospitalization exhibited higher levels of state type anxiety (Carvalho et al., 2008; Korja, Savonlahti et al., 2008; Schmucker et al., 2005; Singer et al., 1999; Weiss & Chen, 2002; Zelkowitz, Bardin, & Papageorgiou, 2007).

The presence of other maternal psychosocial risks may contribute to the increase in levels of stress in mothers of premature infants, increasing the clinical levels of anxiety and depression. Interestingly maternal state anxiety levels associated to perinatal emotional distress or to delayed high-risk newborn discharge, significantly correlated with personal trait anxiety levels. These data indicate that mothers with higher trait anxiety will react stronger to the emotional challenges of the NICU treatment, resulting in elevated levels of state anxiety (Zanardo et al., 2003).

Furthermore other maternal variables as educational level, the number of children (Davis et al., 2003; Zelkowitz et al., 2007), the level of informational support perceived and a warm,

caring attitude by hospital staff (Auslander, Netzer, & Arad, 2003) have an effect on maternal depressive and anxiety levels.

Poehlmann and colleagues (2009) shown that preterm mothers who experienced more risk factors reported more depressive symptoms just before their infant's NICU discharge and showed less decline in depressive symptoms in the months immediately following the child's birth. Although cumulative risks predicted depression trajectories, this effect appeared driven by maternal and family socio-demographic risks rather than infant risks.

CHAPTER 3
MOTHERS-PREMATURE INFANTS EARLY INTERACTIONS: PROTECTIVE AND RISK FACTORS

The quality of mother-infant interactions has been conceptualized as an important mediator between perinatal events/infant's inborn regulation and the later developmental outcome of the infant. For this reason mother-infant interactions are a major focus of study in preterm and other high-risk infant groups.

In this regard, the research that has been conducted over the last decades has documented that interactional behavior and affect appear to be different in preterm infant-mother dyads than in full-term infants and their mothers.

In a pioneer, longitudinal study Crnic and colleagues (1983) found that premature infants are less active and less responsive than full-term infants; they vocalize and smile less frequently, avert their gaze and bodies more frequently, and show less positive general affective tone.

In addition more recent studies confirmed these results, highlighting in particular, beginning from the first month of life, less face-to-face interaction and eye contact with mothers (Malatesta, Grigoryev, Lamb, Albin, & Clayton, 1986; Schmucker et al., 2005), more disorganized biological rhythms, a limited capacity for arousal modulation, and lower thresholds to negative emotionality in preterms compared to their born at term peers (Feldman, Weller, Sirota, & Eidelman, 2003; Lester, Hoffman, & Brazelton, 1985; Malatesta et al., 1986).

In Korja and colleagues' study (2008) preterm infants showed, at 12 months of corrected age, a lower quality of play and attention skills and a more sober and withdrawn mood than full-term infants. This passive interactive style was confirmed also at 18 months of infant age (Muller-Nix et al., 2004).

Interestingly, according to Singer and colleagues (2003), the lower responsiveness that characterize preterm infants increase, during the first year of life, at a slower rate than in full-terms, with increasing behavioral differences from term infants over time.

Given these characteristics, some parents may find it difficult to interact with preterm infants in a sensitive and responsive manner. Furthermore premature birth and the subsequent separation between mother and infant have been shown to have a negative effect on the development of mother–infant relationship. Mothers have only little opportunity to be in proximity and in contact with their babies and this in turn could affect their ability to understand the infant's interactive behavior and subsequently their own responsiveness (Feldman et al., 2003; Ferber et al., 2005).

However, while the effects of premature birth on the baby's early social abilities are well known, the impact of premature birth on maternal interactive style is less clear. The literature on maternal interactive style in preterm dyads is inconsistent and leads to contradictory findings.

Major group differences point in the direction of less positive affect and greater stimulation by mothers of premature infants during the first year. Mothers of prematures touched less affectionately their infants and are less responsive in their facial expressions when compared to mothers of full-terms infants (Crnic, Ragozin, Greenberg, Robinson, & Basham, 1983; Schmucker et al., 2005). Maternal dyadic interactions are in general characterized by more negative affect than full-term infant mothers (Fiese, Poehlmann, Irwin, Gordon, & Curry-Bleggi, 2001). While maternal positive involvement decreased with age, maternal stimulation and negative control increased (Holditch-Davis, Schwartz, Black, & Scher, 2007).

Malatesta and colleagues (1986) reported that mothers of preterm infants showed in general more nonmatching emotions. These mothers failed to match children's emotions of surprise and sadness and tent to match and ignore significantly more infant's anger expressions. These authors suspected that maternal responses to these affects in preterm infants were anomalous because of the preterm infants' greater irritability and greater reluctance or inability to engage in sustained face to face interactions.

On the other hand, mothers of preterm infants during the first months of infant's life spend more time in proximity to babies and in general are more active and stimulating with their infants than mothers of term infants. Later as infancy progresses, these initial higher rates of stimulation increase at a slower rate than those observed in term mothers. By 12 months, mothers of preterm infants provide lower amounts of such stimulation than term mothers (Crnic et al., 1983; Korja, Maunu et al., 2008; Singer et al., 2003). It seems that preterm

mothers, over time, are able to adjust their interactive behavior to their less responsive infants. The authors hypothesized that as preterm infants are less responsive than full-term infants, they may require more stimulation from mothers to elicit responses (Goldberg & DiVitto, 1995). The higher stimulation may then be appropriate, given the context, rather than intrusive. Another possible explanation is that maternal stress and the interrupted bonding process may lead to this overstimulation as an indicator of higher intrusiveness and lower sensitivity (Miles & Holditch-Davis, 1997).

In contrast to these findings some studies failed to find differences in maternal behaviors and responsiveness during mothers-preterm infants interactions. Coppola and colleagues (2007) didn't find any main effect of birth condition on maternal sensitivity at 3 months post-term and Korja and colleagues (2008) replicated these findings at 12 months of infants corrected age.

Furthermore, the quality of mothers and preterm infants interaction strongly covaried over time as revealed by Poehlmann and colleagues (2011) highlighting, also in a sample of mother-premature infant dyads, the bidirectional nature of dyadic interactions in emerging mother-premature infant relationship.

For what concern dyadic interactions some studies reported that the quality of parent-premature infant dyadic interactions seemed to be not significantly lower than the one of born at term dyads (Assel et al., 2002; Greenberg & Crnic, 1988; Muller-Nix et al., 2004; Singer et al., 2003). Forcada-Guex and colleagues (2006) found two significant dyadic patterns of interaction equally distributed in a sample of preterm infant dyads: a "cooperative pattern" with a sensitive mother and a cooperative-responsive infant and a more frequent "controlling pattern" with a controlling mother and a compulsive-compliant infant. In contrast in the full-term dyads group, the cooperative pattern represented the largest part of the group, whereas the controlling pattern represented the smallest part of the group. Term dyads did not differ significantly from cooperative preterm dyads on any maternal or infant interactive variable. On the contrary controlling preterm dyads differed from cooperative preterm and all the term dyads showing a lower maternal sensitivity and a higher control, as well as lower infant cooperation and higher compliance. By evaluating the possible impact of the mother-infant dyadic pattern of interaction at 6 months on the infant's behavioral and developmental outcomes at 18 months, the authors found no differences between the preterm infants of

cooperative pattern dyads and term infants. In contrast controlling pattern dyads resulted the more "at-risk" group with more negative and problematic outcomes than those of term infants, as well as than those of cooperative pattern preterm dyads. Even if "at-risk dyads" are more common among premature infants and their mothers, authors failed to find a typical dyadic interactive pattern for premature infants and their mothers.

This is in line with Poehlmann, Schwichtenberg, Bolt and colleagues (2011) who revealed significant variability in individual rates of change in interactive skills in a sample of preterm infant dyads.

These results underline the necessity to take into exam other factors besides birth condition that could influence interactive quality variability within this particularly at-risk group. Limiting analyses to comparisons between preterm and full-term groups, our understanding of the development of preterm infant-mother relationship may be incomplete. Prematurity is more than a dichotomy, and different degrees of prematurity need to be considered in the study of mothers-preterm infants interactions.

This is in line with the transactional model of development (Sameroff, 2009). The child and the environment form a complex system, made up of elements that are also systems, such as the mother and the child. As the preterm birth is a stressful situation for both the mother and the infant, we can assume that there are several factors affecting the preterm infant-mother relationship that can originate on both the infant's and the parent's side. These factors could explain the inconsistent findings reported above.

Interactions between mothers and premature infants are affected by factors within the infant, such as infant characteristics and severity of illness, for example; factors within the mother, such as maternal characteristics and psychological wellbeing; and factors in the larger family environment, such as the socioeconomic condition and the amount of support provided to the mother. Understanding how these factors relate to mother-preterm infant interactions may help clinicians to plan interventions to improve the quality of interactions.

Within-group designs, such as those focusing on preterm samples, can highlight the diverse challenges and strengths that families with a preterm infant experience and can foster our understanding of resilience in this high risk group.

In the following paragraphs the literature on mother-preterm infant interaction will be reviewed highlighting those factors that, associated with infant birth condition, play a

significant role in influencing the quality of this interaction within this group. This, in a transactional perspective, with the aim to highlight all the potentially protective and risk factors of mother-premature infant interactions and their interplay with premature birth. At the end of the chapter a brief synthesis of the effect of the quality of mother-infant interaction on preterm infant's outcomes is reported.

3.1 The preterm infant's characteristics

A child characteristic that has been reported to affect mother–premature infant interactions is infant gender even if findings are not consistent. Some studies reported mothers to be more responsive and cognitively stimulating with preterm boys than girls (Engelke & Engelke, 1992; Singer et al., 2003) others found that mothers expressed more positive affect to 3 years old girls than boys, and girls looked at their mothers more often and expressed more positive affect (Cho, Holditch-Davis, & Belyea, 2004).

However, the most of the studies didn't consider this variable or failed to find this association between preterm infant gender and mother-premature infant interaction quality. As an example in the study of Holditch-Davis and colleagues (2007), a number of variables, including gender, did not reach criteria for inclusion in any final analyses, indicating that they were not directly related to mother-premature infant interactions. This is consistent with Fiese and colleagues (2001) who didn't find any gender differences in the total degree of mother-premature infant interactional reciprocity and positive affect at 6 months post-term.

Multiple birth, a condition particularly common in the very preterm and extremely preterm births, could be considered an additional risk factor on preterm births (Clark, Woodward, Horwood, & Moor, 2008). Caring for multiple infants is more difficult and stressful for mothers than caring for a single infant; in these cases the exclusive parenting available to each infant is reduced. Furthermore premature infants characterized, as reported above, for their poor self-regulation abilities are more dependent on the sensitive handling of the environment to reach optimal development. Under the high stress of raising more than one infant, maternal investment in the infant if he/she is less easy to handle or is a less rewarding social partner, as the premature is, is likely to decrease, placing the child at an especially high risk for maladaptive development.

Compared with mothers of premature singletons, mothers of premature twins exhibited fewer initiatives and responses, were less responsive to positive signals (Ostfeld, Smith, Hiatt, & Hegyi, 2000) and showed lower maternal positive involvement (Holditch-Davis et al., 2007). A triplet birth resulted in turn significantly more stressful than the birth of twins. Feldman and colleagues (2004) found that mothers of triplets showed lower levels of maternal sensitivity and less dyadic synchrony compared with mothers of singletons and twins across infancy. Furthermore triplets premature infants displayed less simple symbolic play than did singletons and twins, with no differences between the other two groups. Lower maternal sensitivity, in turn, interfered with the multiple infants' cognitive and behavioral development.

Previous research highlighted infant physiological regulation as a key biological factor in infant early social and emotional development. Several studies analyzed infant physiological regulation by monitoring infant hearth rate variation (HRV) as a greater variability in heart rate is an indicator of better emotion and attention regulation and self-regulation. This indicates that the vagal system is an important foundation for the child's later capacity to manage stress, to focus attention, and to achieve enough flexibly to adapt to the environment.

Premature infants have higher heart rates and reduced HRV relative to full-term infants and this is an index of more risk for physiological deregulation. Upon reaching the age of term, HRV is still often lower in preterm infants, suggesting that premature extra-uterine life may delay physiological maturation (Feldman, 2009).

Poehlmann Schwichtenberg, Bolt and colleagues (2011) reported that post-feeding HRV prior infant hospital discharge significantly predicted rates of growth in premature child and maternal interaction quality over time. Preterm infants with higher vagal regulation exhibited less optimal positive affect and communication at 4 months. Although, these infants' positive affect and social and communicative competences increased significantly more over time and the dysregulated behaviors and irritability reduced more over time. In so that, by the toddler period, their skills exceeded those of infants with lower vagal regulation. The authors speculated that higher vagal regulation during the post-feeding period may have contributed to dissipate the stress response associated with feeding in preterm infants, suggesting greater adaptability to environmental challenges and influencing positively the development of mother-infant interactions over time (Poehlmann, Schwichtenberg, Bolt et al., 2011).

Also the organization of the sleep–wake cycles may support the emergence of arousal and emotion regulatory structures. These systems are central for the development of parent–infant synchrony. According to maternal reports preterm infants sleep more than the full-term infants (Feldman, 2006; Korja, Maunu et al., 2008) and the sleep-wake cyclicity, vagal tone, orientation, and arousal modulation were each uniquely predictive of mother-preterm infant synchrony at 3 months (Feldman, 2006). Maternal sensitivity, maternal anger/hostility and infant feeding route were associated with infant sleep–wake parameters at 4 months post-term and mothers who engaged in more angry, hostile, and critical interactions during play at 4 months had infants who woke up more times at night. This association is reciprocal. Infants who experienced play interactions marked by more sensitivity, connectedness, and communication took more naps and slept more during the day (Schwichtenberg & Poehlmann, 2009).

The findings thus demonstrate that infant personal characteristics, the organization of biological rhythms, the infant's capacity to orient to the environment, and the ability to regulate arousal efficiently all contribute meaningfully to the quality of mother-premature infant interactions.

3.2 The preterm infant's physical health condition

It has been suggested that the severity of infant's physical health problems may be a key factor that influences the development of mother-premature infant relationship over time.

Some researches indicate that the preterm infant's immaturity is an aspect that makes it more difficult for the mother and the infant to interact with each other. Infants' immaturity has been evaluated using infant gestational age and birth weight, two variables that strictly correlate with each other (Poehlmann, Schwichtenberg, Bolt et al., 2011).

Smaller for gestational age preterm infants had lower quality play, interest, and attention during interactions with their mothers at 4 months (Poehlmann, Schwichtenberg, Bolt et al., 2011), cry less (Korja, Maunu et al., 2008), had poorer emotional regulation, attention, and behavioral control at 2 and 4 years post-term (Clark et al., 2008) and played with objects less at 3 years (Cho et al., 2004) than preterm infants born closer to term. Parents of extremely preterm children appeared less sensitive to their children's cues and more intrusive during

problem solving at age 2 (Clark et al., 2008), touched less, interacted less, and provided fewer play materials for their 3 years children (Cho et al., 2004).

In contrast Korja and colleagues (2008) failed to find differences between small for gestational age and non-small for gestational age preterm infants in the duration of maternal holding, or in any maternal, infant and dyadic characteristic of interaction at 6 and 12 months post-term and Lester and colleagues (1985) found that the coherence of monadic phases of interactions is unrelated to gestational age.

Only few studies used infant birth weight as an infant risk variable with some revealing that lower birth weight was significantly associated with more problematic quality of dyadic interaction (Fiese et al., 2001) and others failing to find this association (Holditch-Davis et al., 2007). The number of days spent in the hospital, another possible indicator of prematurity, didn't seem to affect by itself the quality of dyadic interactions at 6 and 12 months post-term (Korja, Maunu et al., 2008).

Otherwise most of the recent studies measured infant neonatal health conditions using cumulative indexes of risk defined as the sum of perinatal factors common for preterm infants such as lower birth weight, 5-min Apgar, longer hospitalization, the presence of congenital malformations, experiencing for example apnea, mechanical ventilation, bradycardia or bronchopulmonary dysplasia during the neonatal period and others. With respect to this comprehensive variable higher scores indicate greater risk.

In Poehlmann and Fiese's study (2001) premature infants who experienced more health risks during the neonatal period, including lower birth weight, lower Apgar scores, longer hospitalization and intubation, and more respiratory complications, were more likely to exhibit problematic dyadic interactions with their mothers at 6 months. Also Feldman found that although the low-risk preterm group did not differ from the full-term group on the continuous measures of synchrony and on neonatal orientation, on negative emotionality and arousal modulation high-risk infants scored significantly below the full-term group at 3 (Feldman, 2006), 6 and 12 months (Feldman, 2009). Furthermore high-risk infants showed lower emotion regulatory capacities at 3, 6 and 12 months and they used less regulatory behaviors during stressful stimulations and had less focused attention and lower capacities for coping with maternal separation at 12 months then the low risk and full-term groups (Feldman, 2009).

These findings, consistent with other studies, underlined the effect of neonatal complications on premature infants interactive abilities (Feldman, Eidelman, & Rotenberg, 2004; Fiese et al., 2001; Holditch-Davis, Cox, Miles, & Belyea, 2003; Keren, Feldman, Eidelman, Sirota, & Leste, 2003). On the other hand not all the studies support these results with some failing in finding associations between preterm infants interactional competences and neonatal medical risks during the first months (Lester et al., 1985) and longitudinally within the first year of life (Singer et al., 2003).

At the same time infant neonatal medical risks affect maternal interactive behaviors starting from the beginning of their interactive story. Several days before infant hospital discharge mothers of high-risk infants reported lower levels of readiness for motherhood, touched their infants less often, and were less adapted to their infants than mothers of low-risk babies (Keren et al., 2003). The lack of sensitivity of mothers of higher risk infants had been observed till the end of the first year of infant life (Feldman et al., 2004; Muller-Nix et al., 2004; Schmucker et al., 2005).

Holditch-Davis and colleagues (2003) compared a group of 6 months old non-chronically ill premature infant dyads with a group of the same age of medically fragile preterm and full-term infant dyads. Unexpectedly they found that mothers of non-chronically ill premature infants showed lower gestures and touching behaviors directed towards the infant and provided less social stimuli than did mothers of medically fragile infants. In line with these findings and with previous researches (Greenberg & Crnic, 1988) in a more recent study Poehlmann, Schwichtenberg, Bolt and colleagues (2011) found that mothers of preterm infants with more neonatal health risks exhibited more positive affect, involvement, and verbalizations and less intrusiveness, insensitivity, and inconsistency during interactions at 4 months than did mothers of preterm infants with fewer neonatal health risks.

It is possible that within preterm infant dyads, mothers of infants who experienced more health risks early in life may exhibit heightened sensitivity to their infants' cues and fewer intrusive behaviors, thus facilitating children's social engagement at an early age. On the other hand mothers of the less at-risk prematures were probably responding appropriately to their infants' better maturity and independence when they interacted less with them (Holditch-Davis, Cox et al., 2003).

This is consistent with the hypothesis that suggests a role of compensation of maternal behaviors for infant interactive difficulties in more at-risk preterm infant dyads.

Furthermore Holditch-Davis and colleagues (2003) findings, reporting that both the medically fragile prematures and full-terms differed from the non-chronically ill prematures, highlighted that prematurity itself did not have an influencing effect but the infant medical conditions did.

3.3 The mothers of premature infants' family and socioeconomic background

Higher rates of socioeconomic disadvantage and maternal educational underachievement are considered as a risk factor for preterm birth and have been reported in mothers who experienced preterm delivery (Cho et al., 2004; Schmucker et al., 2005). Moreover in general several studies demonstrated that maternal social background characteristics could influence the quality of dyadic interactions. For these reasons these factors are a focus of interest in the study of mothers-premature infant relationship.

In a sample of very low birth weight infant-mother dyads, higher maternal age, socioeconomic status, and education level were related to more cognitive and social stimulation during the first year of infant life (Singer et al., 2003). Again in premature infant dyads, lower maternal education was related to more maternal negative control (Holditch-Davis et al., 2007) and less sensitive and responsive behaviors during interactions (Feeley, Gottlieb, & Zelkowitz, 2005; Zelkowitz, Papageorgiou, Bardin, & Wang, 2009).

In Schwichtenberg and Poehlmann's (2009) study higher levels of socioeconomic (SES) risks, as indexed by less maternal education, younger maternal age, and lower family income, were associated with less sensitive and more intrusive parenting interactions and with poorer children quality of play, interest, and attention at 4 months (Poehlmann, Schwichtenberg, Bolt et al., 2011). These effects tended to be sustained over the first year of infant life (Poehlmann, Schwichtenberg, Bolt et al., 2011). Mothers' higher SES risk predicted lower maternal attention and emotion scaffolding scores at 16-month post-term (Dilworth-Bart, Poehlmann, Hilgendorf, Miller, & Lambert, 2010).

Even though no differences were found in child behaviors by ethnicity even after controlling for illness severity, Caucasian mothers expressed more positive affect, talked more, spent more time in interactions, spent less time uninvolved with their 3 years old

children, and looked at their children more often than non-Caucasian mothers (Cho et al., 2004).

First-time mothers who are supposed to have poorer caretaking skills are probably a more vulnerable group compared with multiparous mothers, especially in caring a preterm infant. These latter mothers provide more developmental stimulation to their preterm infants (Holditch-Davis et al., 2007) and were more emotionally responsive at 6-36 months than other mothers (Engelke & Engelke, 1992).

In addition the social support perceived by premature infant mothers influences the quality of interactions within dyads. In case of mothers who reported higher perceived support at 3 months the interactions were more sensitive and responsive (Feeley et al., 2005).

3.4 The mothers of premature infants' psychological wellbeing

Several researches have shown that mothers of preterm infants are at an increased risk for psychological problems (see Chapter 2.6). This risk extends beyond discharge from the NICU and more symptomatic mothers tent to rate their infants as more negative (Voegtline & Stifter, 2010). It is noteworthy that the infant's medical status did not make any difference in levels of maternal depression (Korja, Savonlahti et al., 2008) and/or anxiety, suggesting that these symptoms are more linked to the experience of preterm delivery itself than to the caring a preterm infant. Thus, it appears that premature birth is a risk factor for the development of the mothering process, in terms of maternal psychological distress, that consequently could lead to less-than-optimal patterns of mother-infant interaction beyond the period of hospitalization and well into the infant's early childhood (Weiss & Chen, 2002).

Keren and colleagues (2003) demonstrated that mothers with positive representations of preterm delivery had more optimal interactions with their premature infant at the NICU than mothers with negative representations, as reflected in the CLIP interview. These mothers showed more adaptation to the infant and more touch. Similarly, infant's interactive behavior, in terms of amount of withdrawal behavior, was predicted by negative maternal representations.

The same research revealed furthermore that maternal depressive symptoms predicted less maternal adaptation and less maternal touch during dyadic interactions, but not infant withdrawal, prior to infant's hospital discharge (Keren et al., 2003).

Mothers of preterm infants with more depressive symptoms had less positive affective involvement and communication behaviors at 6 months of corrected age. This effect was still observed at 12 months compared to non-depressed mothers. The amount of depressive features did not affect infant interactive behavior (Korja, Savonlahti et al., 2008).

Other studies, however, failed to find significant associations between parenting interactions and maternal depression (Holditch-Davis et al., 2007; Schwichtenberg & Poehlmann, 2009).

The level of anxiety symptoms affect maternal interactive abilities with more anxious mothers showing less sensitive and responsive (Feeley et al., 2005; Schmucker et al., 2005) and more intrusive (Wijnroks, 1999; Zelkowitz et al., 2009) behaviors. Schmucker and colleagues (2005) reported very high anxiety levels in mothers the first week after premature birth. This level decreased in the following months, and at 3 months of corrected age, the mean level was comparable to the level of anxiety of mothers with a normal full-term birth. These findings could prove that, over time, mothers adjusted to the situation of having a preterm infant.

Experiencing preterm delivery and parenting a preterm infant is a stressful situation and the level of stress experienced could also influence maternal caregiving. Very low birth weight infants whose mothers experienced psychological distress symptoms beyond the immediate postpartum period received less cognitive stimulation from their mothers (Singer et al., 2003). Interestingly Holditch-Davis and colleagues (2007) found that maternal positive involvement was higher for mothers with more stress due to the NICU environment and the infant's illness. More maternal stress due to the NICU environment and infant illness, were related to less maternal negative control. According to the authors this finding supported what suggested by other investigators that mothers provide more interactions to compensate for the behaviors of sicker infants.

The level of stress the mother experienced as a result of the traumatic experience of preterm birth (see Chapter 7.1 for a more detailed description of the phenomenon) had an impact on maternal interactive quality with more stressed mothers resulting more controlled than lower stressed mothers at 6 months of infant age (Muller-Nix et al., 2004).

In clinical practice, it would be important to identify those mothers of preterm infants who suffer from psychological symptoms and need specific support. Screening of maternal

depressive, anxious symptoms and stress should be included in the clinical practice of preterm infants follow-up.

Another interesting maternal variable to include in the studies is maternal working models of attachment. As we know from previous studies attachment representations are strongly related to maternal interaction behaviors in caregiving relationships. Coppola and colleagues (2007) and more recently Korja and colleagues (2010) found that this relation between maternal representations and mother-infant interactions works in premature infant dyads as it does in the normal population. Furthermore maternal attachment organization may moderate the impact of traumatic intrusion and baby's medical risk on maternal sensitivity (Coppola, Cassibba, & Costantini, 2007). Being a secure mother could be a protective factor that influences the effect of prematurity on mother-premature infant relationship.

3.5 The effects of mother-preterm infant dyads interaction quality on child development

Parent-child interaction quality is a robust predictor of developmental problems and competencies for infants born preterm, including behavioral and cognitive development.

Higher levels of maternal attention-maintaining at 6 months (Smith et al., 1996), maternal scaffolding behaviors at 16 months post-term (Dilworth-Bart et al., 2010) were positively related to infant cognitive and language development. Higher levels of maternal punitiveness during the first year of infant life were related to slower infant's physical growth (DeWitt et al., 1997).

Furthermore parental sensitivity at 2 years of age was an important independent predictor of preterm children's later regulatory competence at 4 years (Clark et al., 2008).

Poehlmann Schwichtenberg, Shlafer and colleagues (2011) found direct associations between early parenting quality and preterm toddler's effortful control and behavior problems. Toddlers whose mothers engaged in more anxious, intrusive, and insensitive interactions at 9 months exhibited shorter delay times at 24 months post-term compared to toddlers whose mothers did not engage in such interactions. In addition, infants who experienced hostile, critical, angry parenting at 9 months engaged in less turn taking and exhibited more externalizing behavior problems at 24 months.

Poehlmann and Fiese's (2001) results indicated that the quality of dyadic interaction at 6 months mediated the relation between severity of preterm perinatal risk and infant cognitive

development at 12 months. These findings point out that, despite their level of neonatal risk, infants who experienced early positive interactions with their mothers were likely to display more advanced cognitive skills at 12 months than infants who experienced problematic interactions. Likewise, Smith, Landry and Swank (2006) confirmed the greater benefit effect of maternal responsiveness on child cognitive development for more at-risk preterm infants than for lower risks preterms.

The stability of maternal responsiveness predicted in children, especially preterm children, faster cognitive growth and social development as reported by Landry and colleagues (1998). The fact that this benefit was more pronounced for preterm than for full-term children enticed authors to suppose that preterm children's mothers would need to display higher levels of maintaining across time, to support their children's greater difficulties in developing social initiating (Landry, Smith, Miller-Loncar, & Swank, 1998). Moreover, as mothers showed further increases in maintaining infant's attention, the high risk children showed greater acceleration in their initiating activities compared to the low risk and full-term children (Landry, Smith, Swank, Assel, & Vellet, 2001). This underlines the role of responsive parenting as moderator between infant risk and cognitive outcomes (Smith, Landry, & Swank, 2006; Smith et al., 1996).

In line with these findings, testing the susceptibility factor on a sample of preterm infant dyads, Poehlmann Schwichtenberg, Shlafer and colleagues (2011) demonstrated that at high levels of infant difficult temperament the positive effect of parenting quality was higher. Angry, anxious maternal behaviors at 9 months were related to internalizing and externalizing behaviors and less effortful control in toddlerhood for children with difficult temperament. These relations did not hold for less distressed infants. These confirmed that difficult preterm infants are more vulnerable to the effects of negative parenting.

These results suggest that engaging in adaptive interactions with caregivers may be protective for and contribute to developmental resilience particularly for more vulnerable infants. The quality of parent-infant interaction appears to be one family-level mechanism linking perinatal complications to developmental outcomes in high risk infants. All these findings underscore the importance of bi-directionality in infant development (Wijnroks, 1998).

PART 2
THE RESEARCH

CHAPTER 4
THE RESEARCH

4.1 Theoretical framework

"Transactions are omnipresent. Everyone in the universe is affecting another or is being affected by another. Everything in the universe is affecting something or is being affected by something else. Everything is in a relationship, from the most complex society to the most elementary particle" (Sameroff, 2009; p. 3).

With the transactional model of development Sameroff explained human development with the relations between any living entity and its experience (Sameroff, 1975, 2009, 2010). Humans live inside an environment, interact with this environment and both the individual and the environment are constantly being changed by their interaction with one another. This means, developmental outcomes are a function of the reciprocal interaction between the individual and the environment.

The necessity to study this bi-directional interplay between factors came from the results of several studies that demonstrated that, unexpectedly, the vast majority of at-risk children grew up well within the normal range of development functioning. This made the authors supposed that even when a well-established risk factor is present many other factors could work either as protective or as promoter of the risk. For example good parenting can compensate for infant temperamental problems and at the same time children with easier temperament can offset the abusive tendencies of their parents (Sameroff, 2009).

Within child development the environment represents the context where the child lives, the characteristics of the people that surround the child and the relationships the child has with the people around him/her. Therefore, from the transactional perspective, child development is seen as the result of the complex bi-directional interplay between the child and the parents' natural personality and traits, as well as family experiences and economic, social and community resources.

Neither the individual constitution nor the environment are constant factors; people are in continuous process of changing over time. For this reason the transactional model stresses also the plastic character of the environment and of the child as an active participant in its own

growth (Sameroff, 2009). The child development is therefore the result of the influence between child's and environmental characteristics and what's more of how these factors evolve over time.

The figure 1 illustrates this model.

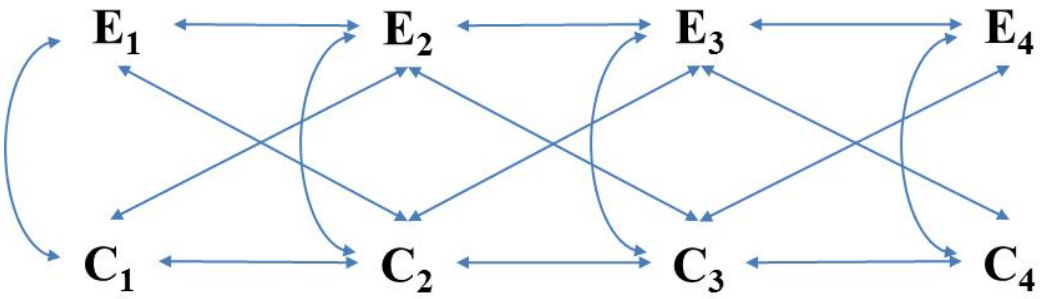

Figure 1 Transactional model with continuities in child and environment, adapted from Sameroff, 2009; p. 15.

When studying mother-infant relationship we must take into consideration that the child and the parents bring different characteristics to, but each also changes as results of, interactions with one another. Both infants and parents are targets. As highlighted by this theory no single factor is damaging or facilitating for children, rather, the power of an individual factor or set of factors lies in their accumulation in the life of any child (Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987).

The present dissertation integrates the transactional model with attachment theory and more recent findings from infant research (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969, 1990; Sroufe, 1997; Stern, 1995; Trevarthen & Aitken, 2001; Tronick, 2007). These theories stress the importance of the development of emotional relationships with other people, in particular of the quality of mother-child interaction, to constitute later child socio-emotional, behavioral and cognitive development.

The common approach of these models proposes that child outcomes are affected by parental (especially maternal) characteristics, contextual sources of stress and support, and child characteristics. As John Bowlby stated "The finding that the quality of care received influences the pattern of attachment developing excludes in no way the infant playing a part too" (1969; p. 367).

Within these theoretical models the study of the experience of parenting a preterm infant could not be considered as products of infant prematurity alone. Prematurity is more than a homogenous single risk factor and its implications for mothers and for mother-infant relationship need to be taken into consideration. As highlighted in Chapter 2 the experience of prematurity has a strong impact on maternal wellbeing and the literature review exposed in Chapter 3 underlined how this impact together with maternal and infant characteristics influence mother-premature infant relationship.

The development of preterm infant-mother relationship could be therefore considered the product of the combination of the interplay of maternal, infant and contextual factors (Poehlmann & Fiese, 2001a).

In other words we need to analyze the development of mother-infant relationship in this at-risk group keeping into consideration not only the individual (the preterm infant) but the adaptability between the individual and the environment where the infant lives (Sameroff & Mackenzie, 2003).

The transition to parenthood is a developmental process that goes through different stages and several critical moments. As a transition it involves reorganization and stress. The transition to parenthood has been identified as a period of increased risk and how parents and infant reorganize around transition points, and make sense of transitions becomes important and influences the development of mother-infant relationship. As Fiese and Sameroff underlined "it is possible to enter the process at multiple points and predict a positive trajectory" (1989; p.185).

This is even more true when we analyze the transition to parenthood of mothers of preterm infants (Sameroff & Mackenzie, 2003).

In figure 2 the process of the development of mother-premature infant relationship through the stages and critical moments the mother and the infant have to deal with in a transactional perspective is summarized.

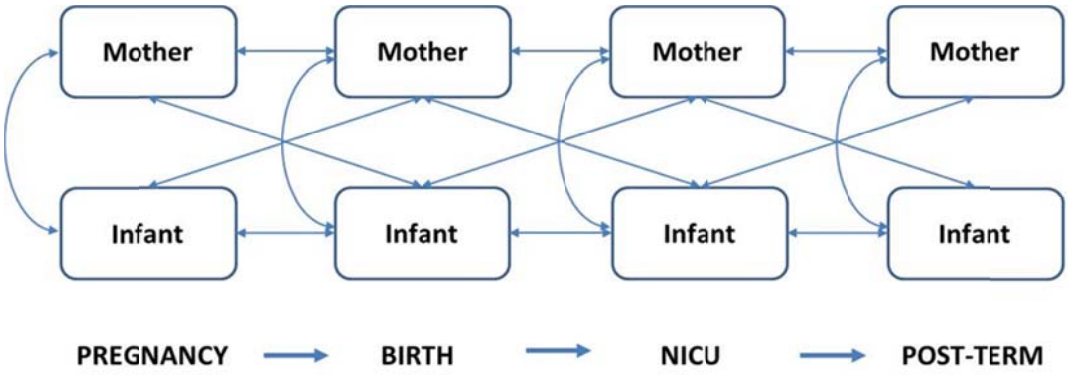

Figure 2 The development of mother-premature infant relationship from a transactional perspective.

These mothers very often have to face at-risk pregnancies and a long hospitalization before infant birth. Preterm delivery is a critical moment, the event is unexpected and mothers have to deal with the separation from their infant and many concerns about his health conditions. The next step is infant hospitalization in the NICU and the many challenges mothers and infants have to face. Finally the transition from hospital to home care is a crucial moment for parents and their premature infants, as the demands increase. Hall and colleagues (2012) affirmed that mothers, after infant hospital discharge, enter in "a new motherhood journey"; the development of the relationship has to "re-start" one or more months after child birth, in a new context under different influences.

Each of these critical moments has an effect on the mother, on the child and on their relationship; in turn this effect influences the transition to the next level.

An ideal complete exploration of the experience of parenting a preterm infant within the transactional perspective should take into consideration all the individual and contextual variables at the different time points and their transaction over time. Longitudinal researches that pay equal attention to the details of each individual and environment would give the perfect evidence of this phenomenon and would help in designing more suitable interventions.

4.2 The research project

4.2.1 Studies goals and hypothesis

The principal aim of this research was to analyze the complex phenomenon of parenting a preterm infant and its implications for mothers and mother-infant relationship during infancy.

Due to the concrete difficulties in realizing such a complex research plan we decided to analyze the transition to parenthood and the development of mother-premature infant interaction with three studies. These studies entered in the process from different points and examined with different methodology what we consider at full the complex course of the development of mother-premature infant relationship.

Certainly this doesn't completely answer to the research questions raised by the literature but it gives much information and what we consider a huge contribution to the study of this phenomenon.

The aims of this study were:

1. To examine maternal narratives of the experience of the transition to parenthood after the birth of a premature infant and his consequent hospitalization in the NICU (Study 1);
2. To examine if prematurity affects the mother's, the infant's and dyadic affects and behaviors in free-play mother-infant interactions at 3 and 6 months of corrected age (Study 2);
3. To study the protective and the risk factors that affect the mother-preterm infant interactions longitudinal during the first 6 months of infant life (Study 2);
4. To explore the role of the maternal Post-Traumatic Stress Disorder symptoms following infant birth as moderators between prematurity and maternal parenting stress (Study 3).

The first study (see Chapter 5) had the aim to collect information about the complex experience of preterm birth from the maternal point of view. This is an example of how the context, the child and the mother mutually influence each other after delivery and during infant hospitalization and affect the transition to parenthood of these mothers. A qualitative method was chosen in order to respond to the lack of studies that explore maternal narratives.

The second study (see Chapter 6) is a longitudinal research focalized on the development of dyadic interactions between preterm infants and their mothers during the first months of infant life. This study micro-analyzed free-play interactions of a group of preterm and full-term mother-infant dyads at 3 and 6 months of infant's age. With the comparison of individual and dyadic interactional behaviors and affective states between the two groups we aimed to examine if any differences existed and, if present, if these differences concerned the child, the

mother or the dyadic interactive behaviors. In a transactional perspective we expected to find differences at all of these levels.

In order to examine deeper the quality of mother-premature infant interactions the second part of the study focalized on the analysis of the factors that interact with prematurity in influencing the development of dyadic relationship. Characteristics of the infant and the mother are taken into account.

The third study (see Chapter 7) is an exploratory study whit data collected through a Web-survey. The aim of this study was to examine perinatal Post-Traumatic Stress Disorder and the levels of parenting stress in mothers of preterm and full-term children. This study proposed a mediating role of PTSD symptoms between preterm/full-term birth and levels of parenting stress.

4.2.2 The utility of mixed method

Mixed method studies combine the qualitative and quantitative approaches into the research methodology of a single study or multiphase study (Tashakkori & Creswell, 2007; Tashakkori & Teddlie, 2002). These designs are useful for gaining a broader perspective on the topic and for studying different groups, or levels, within a single study (Borkan, 2004).

Shweder and colleagues (2006) noted that the study of human development benefits from the integration of symbolic (e.g., beliefs, goals, and rules) and behavioral (e.g., customs and behaviors) aspects of communities. And, as affirmed by Yoshikawa and colleagues (2008) in their fundamental contribution on the utility of mixed methods in developmental science, "In order to conduct integrated studies of beliefs and practices in human development, it is necessary to conduct close observation of behaviors and activities in natural settings as well as to explore the beliefs, intentions, meanings, and goals of children, their caregivers, and others over time" (p. 346).

Thereby examining behavior and belief systems requires both quantitative and qualitative approaches to research. The mixed methods approach has proven to be useful in a variety of empirical researches, reporting that the combination of interview data and standardized questionnaires or observational data, which together provided qualitative and quantitative information about parental experience, could be more appropriate (Meyer et al., 1993; Padovani et al., 2008; Yang, 2008).

We believe that this mixed method approach gives to the research a more comprehensive analytical technique than does either quantitative or qualitative data alone. The mixed method approach allowed us to use the strengths of both quantitative and qualitative analysis techniques integrating them so as to understand the phenomenon of parenting a preterm infant better as suggested by Tashakkori and Teddlie (2002). In this research, qualitative and quantitative results relate to different aspects of the same phenomenon, maternal representations and mother-infant interactions, but may be complementary and thus can be used to supplement each other.

According to Creswell's (2008) definition this study is a parallel studies mixed method design. Even if these studies were conducted from a longitudinal perspective the qualitative phase was separately conducted from the quantitative ones and not in a sequential order. We decided to analyze the qualitative and quantitative data independently and to describe the single findings of each study separately.

Afterwards following the independent analysis of both qualitative and quantitative data, the major findings of each approach are integrated for the purpose of confirmation and completeness of the understanding the phenomenon of parenting a preterm infant and it is these results that are presented in the final conclusions (Creswell, Fetters, & Ivankova, 2004).

Taken together these analyses would indicate characteristics of the potentially at-risk situation of parenting a preterm infant and its implications for mothers and mother-infant relationship. Determine the needs and strengths of parents and infants could furthermore help in planning future interventions.

4.2.3 Methods and procedure: Study 1 and Study 2

Since Study 1 and Study 2 were collected within the same hospitals and within the same project the data collection, the procedure and the ethical considerations are explained below to avoid repetitions. Further details will be given in the dedicated chapters.

The methods and procedure of Study 3 is explained in Chapter 7 because the data come from a completely different sample and were collected under a different procedure.

4.2.3.1 Data collection

Study 1 and 2 were carried out at two hospitals in the north (NICU 1) and center of Italy (NICU 2). NICU 1 is a third level unit in the hospital Azienda Ospedaliera Ospedali Riuniti in Bergamo, data were collected within an agreement with the hospital and with the NICU itself.

NICU 2 is a second level unit in the Ospedale Civile "Misericordia e Dolce " in Prato, data were collected in collaboration with a teamwork composed by three psychologists.

We analyzed the data from both the NICUs within an agreement between the two hospitals and our research group.

Participants of Study 1 come from the NICU 1 while participants of Study 2 come from both the NICUs.

Inclusion criteria for parents of preterm infants were:

a) Both parents consenting to be involved;
b) The infant was born between 28 and 32 weeks of gestation;
c) The infants had no known congenital problems or significant neurological findings during the NICU stay;
d) Mothers were at least 18 years of age;
e) Mothers could speak and understand fluent Italian;

The control group of Study 2 was recruited from the research group coordinated by Professor Riva Crugnola at the beginning of a program organized to follow infants during their first year by a service of the hospital San Paolo in Milano (Riva Crugnola, 2007, 2012). The service is intended for mothers of infants and is aimed at monitoring the infant growth in early infancy. The inclusion criteria for parents of full-term infants were that the infant was born at term without any pathologies at birth. The control group was matched with age of the infant.

4.2.3.2 Procedure

All parents were provided with a participant information sheet, informing them of the purpose of the study as well as of their contribution.

Nurses invited families to participate in the study when the infant's medical condition stabilized and they were out from the TIN. We attempted to arouse the motivation of the family to collaborate with us in "a study of how families deal with prematurity, so that we can find out how to improve our public health services".

The researcher met the parents in an appropriate room inside the hospital. The consent form was read in its entirely and parent anonymity and confidentiality issues were discussed. Parents were informed of how their experiences would be recorded, strategies of managing the data, including storage and securing anonymity. Furthermore, the parents understood participation was voluntary and they could withdraw participation in the study at any time without any repercussions.

All the information necessary was given to parents.

Table 1 shows a summary of the procedure divided for the two studies and for the three study sites.

	Study 1	Study 2	
	NICU hospitalization	3 months	6 months
NICU 1	• Interview on maternal experience (30 mothers)	• Video recorded mother-infant interactions • Adult Attachment Interview (10 mother-infant dyads)	• Video recorded mother-infant interactions (8 mother-infant dyads)
NICU 2		• Video recorded mother-infant interactions • Adult Attachment Interview • (12 mother-infant dyads)	• Video recorded mother-infant interactions (12 mother-infant dyads)
Control group		• Video recorded mother-infant interactions • Adult Attachment Interview (20 mother-infant dyads)	• Video recorded mother-infant interactions (20 mother-infant dyads)

Table 1 Procedure for Study 1 and 2 divided by the different study's sites.

4.2.3 Ethical considerations

The Research Ethical Committees of the hospitals approved the projects and gave consent to undertake the study. The strategies to approach and gain consent from all participants were approved. All participants' data were made anonymous. The data from each mother-infant dyad were coded with an identification number and the name was removed from the data.

CHAPTER 5
STUDY 1
THE EXPERIENCE OF PARENTING A PRETERM INFANT: MATERNAL NARRATIVES ON PRETERM BIRTH AND INFANT HOSPITALIZATION

The literature reported in Chapter 2 indicates how the birth of a preterm infant represents a complex experience and a significant challenge for mothers' equilibriums causing different levels of stress (Miles & Holditch-Davis, 1997; Whitfield, 2003; Younger et al., 1997).

From a transactional perspective, mothers' experiences of parenting a preterm infant develop during several moments, beginning from pregnancy throughout delivery and hospitalization. There are several interplaying factors that influence this process: the pre- and postnatal events, such as at-risk pregnancies and maternal hospitalization; the preterm delivery; characteristics of the infant, such as his/her postnatal medical condition and appearance; the characteristics of the mother and her reaction to such stressful experiences; and finally, the characteristics of the environment, the NICU, with its hospital policy and healthcare providers' behaviors (Talmi & Harmon, 2003).

Understanding this complex parental experience in a more complete perspective is important to not only meet the parents' requirements and concerns and enhance their well-being but also promote the mother-infant relationship.

For these reasons, the main goal of this study was to analyze in depth the maternal experience of preterm birth and infant hospitalization.

Because the real experts on mother's needs are the mothers, one method to gain understanding is to listen to what these mothers say regarding their experience and feelings. Unfortunately, neonatal nurses and physicians seldom have the opportunity to hear mother's stories directly and fully. Many of the interactions with mothers are focused on the infant medical condition or relatively brief. In addition, the mother herself is more focused on the infant's needs when interacting with the medical staff.

Despite their clinical applicability, the indicators of psychological stress obtained using psychometric scales do not fully understand the types of maternal emotions. Particularly, the scales do not provide information regarding the complex experience of parenting under these

stressful conditions. It is necessary to use other parameters related to maternal emotions which correlate with the experience of a preterm birth.

The mothers' narrative reports obtained using interviews may provide the mother an opportunity to spontaneously express her emotions, anxieties and difficulties related to the premature birth and subsequent hospitalization of the infant. A deeper analysis of the main relevant themes linked to this experience may provide clinicians with cues regarding a mother's adaptation following her baby's premature birth. These cues might assist nurses and clinicians to develop interventions that promote family-centered and mother-infant relationship supportive care.

5.1 Study goals and hypothesis

The purpose of this study was to explore and describe mothers' concepts and expectations after premature delivery and their infant's admission to the NICU.

Within the transactional model of development (Sameroff, 2009), we expected to observe that the preterm delivery and infant's hospitalization play an important role in the transition to parenthood and development of their relationship with the infant for these mothers.

5.2 Method

5.2.1 Participants

The participants were 30 mothers of premature babies born within the 28th and 32nd week of gestation. The characteristics of the participants, recruited in NICU 1, are described in Table 2. All the mothers except one had a cesarean delivery. The 40% of them experienced previous abortions and the 30% of the pregnancies was a result of assisted reproduction procedure.

We decided to focus the interest on mothers of premature infants without comparing their experience with a reference full-term infant mothers group. This because the focus of the study was the particular experience of the preterm delivery and the consequent hospitalization of the infant, a situation completely different from what is experienced after the birth of a healthy, full-term infant. As reported by Padovani and colleagues (2008) very infrequently mothers of full-term infants experienced difficulties related to infant birth. On the contrary the 70% of mothers of preterm babies spoke about reactions and feelings at the time of the child's birth focusing o negative/conflicting emotions.

	Mothers							Infants			
N°	Age	Employ	Education	Nationality	Status	First Mothers	Hospitalization Before Delivery[a]	Age At Interview[a]	Gestational Age At Birth[b]	Multiples	Weight At Birth[c]
1	32	Housewife	High School	Italian	Cohabiting	Yes	3	85	31.00	No	1.280
2	23	Housewife	High School	Albanian	Married	Yes	0	46	30.00	No	1.580
3	33	Architect	University	Italian	Cohabiting	Yes	0	25	29.71	No	1.320
4	41	Office Worker	University	Italian	Married	No	0	35	27.57	Yes	.955; .980
5	39	Freelancer	University	Italian	Married	Yes	23	69	27.28	No	.819
6	38	Nurse	University	Italian	Married	Yes	40	23	30.14	No	.710
7	39	Teacher	University	Italian	Cohabiting	Yes	0	21	30.00	No	.730
8	33	Clerk	High School	Italian	Married	Yes	44	79	27.28	No	.470
9	33	Teacher	High School	Italian	Married	Yes	0	31	30.00	No	1.095
10	41	Office Worker	University	Italian	Married	No	35	48	29.42	No	1.570
11	40	Tour Manager	University	Italian	Married	Yes	1	23	36.00	No	2.000
12	40	Office Worker	High School	Italian	Married	Yes	0	13	34.00	No	2.660
13	36	Office Worker	University	Italian	Married	Yes	7	17	29.57	No	1.375
14	34	Office Worker	University	Italian	Married	Yes	60	27	28.00	Yes	.981; .940
15	34	Teacher	Doctorate	Italian	Single	Yes	7	10	31.71	No	1.750
16	34	Housewife	Middle School	Italian	Married	No	4	36	29.85	No	.913
17	34	Qualified Worker	High School	Equadorian	Married	Yes	20	9	32.00	No	2.080
18	35	Medical Assistant	High School	Italian	Married	Yes	2	25	30.00	Yes	1.450; 1.450
19	36	Office Worker	High School	Italian	Cohabiting	Yes	0	10	33.00	Yes	2.200; 1.600
20	41	Educator	High School	Italian	Cohabiting	No	1	60	24.57	No	.840
21	28	Carer	High School	Romanian	Cohabiting	Yes	4	10	30.00	No	.999
22	38	Housewife	University	Italian	Married	No	4	69	25.71	Yes	.605
23	35	Teacher	University	Italian	Cohabiting	Yes	21	65	32.28	No	1.560
24	27	Office Worker	High School	Italian	Married	Yes	17	7	28.71	No	1.340
25	33	Office Worker	High School	Italian	Married	Yes	4	5	32.71	No	1.750
26	29	Teacher	University	Italian	Married	Yes	30	12	30.57	No	1.263
27	38	Barmaid	High School	Italian	Cohabiting	Yes	2	30	27.00	No	.580
28	34	Office Worker	High School	Italian	Married	Yes	0	8	30.57	No	1.480; 1.370
29	36	Housewife	High School	Italian	Cohabiting	No	15	8	29.71	No	.770
30	31	Office Worker	University	Italian	Married	Yes	0	8	31.14	Yes	1.700; 1.650

Table 2 Study 1. Demographic characteristics of the participants.
Note: [a] = in days, [b] = in weeks, [c] = in kilos.

5.2.2 Procedure

The mothers were approached when the infant's medical condition stabilized and they were transferred from the Intensive Therapy Unit to the NICU (M = 34 days after infant birth, SD = 24). Nurses invited the families to participate in the study. The parents were provided written and verbal information regarding the project and were asked whether they would participate (for a more detailed description of the procedure see Chapter 4.2.3.2).

We met the parents in an appropriate room inside the hospital. After reading and signing the consent form, the interview was administered to those parents who agreed to participate in the study.

The interviews were audio recorded and subsequently verbally transcribed.

5.2.3 Measures

Information about the family was collected before starting the interview.

Information about infant medical condition and his/her history of hospitalization was collected reviewing medical records.

The interview was a semi-structured interview developed ad hoc for this research following the aims of the study and research questions. The literature review, in particular the study of Padovani and colleagues (2008) and the CLIP interview developed by Meyer and her research group (1993), greatly assisted in specifying the range of useful questions to better understand deeply maternal experiences.

The interview (see Appendix A) was intended to review the mother's attitudes toward the pregnancy, her reactions to the early termination of the pregnancy and the delivery, her thoughts and worries concerning the current situation of the infant's recovery and finally her fantasies regarding the infant and future relationship with him/her.

The mothers were asked to narrate the main positive and negative aspects related to these key moments of the transition to motherhood. The questions and probes are reported in Table 3.

The interview was administered in an open way with a non-interventionist style in an empathic and understanding climate while attending to maternal emotional reactions and making the mother feeling comfortable and accepted.

The interviews lasted an average of 1 hour. We also maintained notes regarding previous pregnancy experiences and the history of the pregnancy and preterm delivery to complement the recorded interview data.

• Would you like to talk about your own pregnancy experience? How did you experience it and how did you feel? Could you figure out some satisfaction aspects about the experience of pregnancy? And lack of satisfaction?
• Which is your opinion about the reasons for the preterm delivery? You have been given a medical explanation, does this latter match with your own opinion about the reasons why you had a preterm delivery?
• Would you like to talk about your own delivery experience? How did you experience it and how did you feel? Could you figure out some satisfaction aspects about the experience of delivery? And lack of satisfaction?
• Would you like to talk about the experience of child hospitalization? How are you experiencing it and how do you feel? Could you figure out some satisfaction aspects about the experience of infant hospitalization? And lack of satisfaction?
• How did you imagine your child should have been? What aspects of satisfaction do you have about your own child? And lack of satisfaction?
• If you think about the future growth of your child, how do you imagine him/her? How would you like the child to be and not want to be? What are you worrying about?

Table 3 Interview questions and probes.

5.3 Data analysis

A qualitative analysis of the interview transcripts was performed using inductive thematic analysis, in which dominant themes were identified through a careful examination of the data (Braun & Clarke, 2006; Flick, 2009).

The interviews were verbally transcribed taking annotations about any other useful information as well as the emotional tone of the mother. The transcribed data were then read and read again several times and notes and ideas were generated through transcription and data immersion. We identified codes and repeated patterns within the data that we considered pertinent to the understanding of maternal experience. The next stage involved searching for themes; different codes that may have been very similar or may have been considered focused on the same aspect within the data were combined. All initial codes relevant to the research question were incorporated into a theme. Further coding also took place at this stage to ensure no codes had been missed in the earlier stages. Once a clear idea on the various themes and how they fitted together emerged, the themes were defined and named. Considerations were made not only around the story told within individual themes but also how these related to the

overall story evident within the data. The final stage, the report production, involved choosing examples of transcript to illustrate elements of the themes and of the subthemes.

All data were analyzed in their original language to preserve the participants' original meanings, although thematic headings were formulated in English only.

5.4 Results

The analysis revealed relevant major themes describing the mothers' experiences.

The main themes concern: 1) the construction of maternal identity; 2) the construction of the representation of the bond with the infant; 2) the relationship with health care providers and the external world.

These themes are articulated into different subthemes (see Table 4).

Theme 1: The construction of maternal identity
• Thrown into motherhood
• The inability to protect the baby
• Limbo between being and feeling a mother
• The loss of the parental role
Theme 2: The construction of the representation of the bond with the child
• "Is that baby my baby?"
• Hanging by a thread
• The lack of physical contact
Theme 3: The relationship with the healthcare providers and external world
• The support from medical staff
• Disorientation and the absence of communication
• Being special mothers

Table 4 Themes and subthemes resulted from the analysis of maternal narratives.

The subthemes are indicated by italicized headings within each thematic category. Brief excerpts of the data are presented below to illustrate the meanings of the themes and subthemes.

5.4.1 Theme 1: The construction of maternal identity

This theme reflects the effect of the experience of prematurity on the construction of the woman's sense of herself as a mother. The preterm delivery and subsequent infant's hospitalization represent a limbo between "being a mother" and "feeling as a mother" for the woman. The pregnancy is over but the woman does not yet represent herself as a mother.

This theme is articulated into four subthemes.

Thrown into motherhood

The majority of preterm deliveries in this sample were unexpected. The mothers suddenly had to go to the hospital, and the majority discovered that the baby was to be born only a few hours before delivery.

The mothers reported that it was impossible to process what was happening. Their lives changed in a few hours, and they observed themselves as mothers without having time to understand.

> *A sudden thing changes your life in a few seconds. You cannot focus on it. You must run after it and that's it.*
> *There was absolutely no, no problem. This thing was just like a sudden "cold shower". Something that I never thought about in my life. I was thrown into the baby's birth.*

All except one of the mothers underwent caesarean birth. From a medical perspective, there is nothing similar to a normal delivery, and the caesarean, experienced as a surgical intervention, did not help the mothers experience the birth as "normal" childbirth.

One of the mothers said that she felt as if she was deprived of motherhood with the delivery.

> *They took my little child away from me, and until I saw her the next day, I did not digest the birth. It was a weird situation in a sense. Yes, a delivery, but an artificial one.*

Therefore, the preterm delivery for these mothers interrupted their transition to parenthood. In their representational world, the delivery did not dovetail with the infant's birth.

The inability to protect the baby

Most of mothers did not know the medical reason for the baby's preterm birth. More often than not, there was no scientific reason for preterm births, and at other times, it was because of some physical problems of the mothers themselves. Both these situations are difficult to accept and could lead to the feeling of "being guilty".

Looking for the reason why they delivered before term, mothers blamed themselves and argued that they did something wrong.

I feel guilty, because you know…"if I had measured the pressure, if I (...)", in spite of everything you've done, you say, "what did I do wrong, what did I do wrong to do this to him"?

Simultaneously, the mothers' inability to carry the pregnancy to term influenced their perception to not have being able to protect the baby.

Previously, mothers of prematures generally blame themselves a bit. "Maybe I did something, maybe I could, maybe…". I do this even more because although I'm physically healthy, unfortunately, I cannot, as a woman, take the pregnancy to the end.

The maternal body could turn into a dangerous place for the infant. The following mother stated that the womb was no longer a protective and safe place for her baby:

To take him out of my belly, they had to hurry to get him out of this bastard of my belly. Unfortunately, my belly was not generous with my son… unfortunately these things happen.

The mothers view the infant as too small and vulnerable, and some were afraid to harm the baby even after birth.

I'm a little tense when I take her up because everything is new, but what's more important... I fear hurting her when I touch her.

These guilty feelings are linked to the perception that these mothers had of not being able to protect the baby during pregnancy. This sense inevitably translated after delivery during infant hospitalization. This inability to be protective influenced the mothers' representations as being good mothers.

Limbo between being and feeling a mother

Being a mother is not only linked with the ability to protect the baby, as emphasized by the previous subtheme, but also with the ability to care for the baby. Within the context of the NICU, these mothers cannot have this experience.

I cannot cuddle him at home. This is it. It is the situation itself that does not allow you to be the mother already (...) no, I already feel like a mom, but I cannot take care of my own child.

When the mothers are home they realized they are no longer pregnant; simultaneously, the baby is not physically present in the house. They are mothers but they do not have the baby with them.

Yes, I definitely have been thrown in another… dimension… because I now assert "he's here" although I haven't got him here at home, he is in the hospital.

The hospital physically represents a limbo, an artificial place between the womb and birth.

It's not like giving birth and bringing home a baby and having the problems that a newborn baby can give you. It's something different. You come home and the child is not there, it is here but in the hospital.

The mothers can only be a mother for a limited amount of time during the day, and this timetable is decided by the hospital. The following explains that the mothers could not be with their babies when they wanted to or when they perceived that the baby needed them:

In my opinion, the main difficulty for the mother is when she has to go away. She is here for half an hour or for an hour. She performs kangaroo therapy and then she has to go…

It was tough to leave her (the baby), even when she was not well and they had operated on her I would prefer, even if she sleeps, to stand here and to look after her. It is tough to have to go away and to leave her there.

The main implication of this subtheme is related to how the impossibility to have the baby with them influences the women's feelings of parenthood. The mothers were separated from their baby after delivery and experienced continuous separations during the infant's hospitalization. These mothers felt as if they were living in a psychological limbo between the experience of being a pregnant woman and a mother.

The loss of the parental role

The mothers observed that acting as a mother was unexpectedly difficult. Even holding, feeding and caring for the baby, which are all normal, expected maternal experiences, were difficult because the baby was perceived as in danger because of his medical conditions. The mothers felt as if they lost the maternal role they had during pregnancy and the role they expected to gain after delivery.

A key aspect of this loss was sharing the parental role with nurses. The machine and nurses, not the parent, are the primary and more competent caregivers. The de-legitimization of the maternal role with respect to the hospital staff is characterized by several ambiguous factors. The nurses know the best methods to interact with the baby, and the mothers recognized that they must learn these methods from the nurses. On one hand, this learning assists the mothers in handling the difficulties of caring for a preterm baby; on the other hand, the learning contributes to their perception of inadequacy.

When the mothers are encouraged by nurses to care for their infants, this encouragement contributes vastly to the women's sense of "feeling like a mother".

> *The nurse tells you how to touch it. I could not even touch it, I really feared hurting him. Then, you find these small humans* (the nurses)*, who appear as angels fallen from heaven, that tell you what to do.*

This loss of the parental role particularly affected the mothers' abilities to advocate and make decisions for their babies. Most of the mothers had the perception that they cannot make decisions for the baby and must trust the nurses' behaviors and rely on the nurses' decisions.

> *And you had to rely, you had to rely, because you know that you cannot do anything. You do not know what to do, it is not you who can decide. Then, I entrust them with the hope that they know what they are doing!*

Simultaneously, the mothers constantly felt supervised by the staff and must ask the medical staff permission whenever they wished to touch or take care of their infant. The women often spoke of being "allowed" or "not allowed" by the nurses to handle their own infants. Mothers often perceived these instructions as a judgment of their caregiving abilities.

It is very difficult because you say "may I hold him today?" And no, they say "not today" (she cries). *It is as if he is no longer mine, and I have to accept it.*

The mothers perceived that some neonatal nurses use their control to limit parental involvement in their infants' care. The mothers reported that occasionally they can have contact with the baby and other times they cannot. In their perception, no explanation was provided so they could not understand the reason behind the nurses' decisions. This perception enhanced the mothers' confusion.

Moreover, every day I find a different nurse and everyone has his personal theory. One says you can hold him before meals, another one you can hold it after meals…now he sleeps, I'm not going to give him to you. Now he sleeps, I'll give him to you because he is quiet… I said damn you! You decide, but if you say I can hold him and you say this is right, that's okay, that's it!

This feeling of inadequacy also had an effect on the projection of being a good mother after the hospital discharge for some of the mothers. For example, this mother worried about not understanding infant language.

When he gets out of there I really do not know. There is the fear that he will not feel well, the fear not to notice that something is wrong, not to immediately understand his language.

Therefore, the hospital practices that are more centered on the medical care of the infant rather than facilitating parent-infant closeness or promoting the development of parental sensitivity and attachment, contributed to the enhancement of these mothers' idea, according to the mothers' perceptions, that they are not parenting their infants as expected.

5.4.2 Theme 2: The construction of the representation of the bond with the child

The preterm birth and subsequent hospitalization of the infant affected the capacity of the mother to develop a connection with her child. The inability to keep the baby with them, bring him/her home, and the constant feeling of risk in which the child is perceived as being in, made it difficult to build a representation of the infant's own identity and the bond with him/her.

This theme is articulated into three subthemes.

"Is that baby my baby?"

Most of these mothers did not have the opportunity to see their baby directly after delivery. Because of their difficult medical conditions, the babies were placed in the Intensive Therapy Unit or in the NICU, and the mothers could see them only when their physical conditions allowed them to go to the NICU themselves.

The initial contact was under the supervision of the medical staff. The physician showed the mother who was her baby in the NICU. This experience, combined with the traumatic and sudden experience of preterm delivery, strongly influenced the maternal ability to develop a bond with the infant.

It counts a lot on the formation of the bond with the child; that is, one sees her the next day and they have to tell you that is your daughter… it is a bit tough… and even after that, the bond I imagined it would have been at the beginning did not develop.

This mother said that she had difficulties in recognizing that the baby in the NICU was identical to the one she held in her womb during pregnancy.

I feel her more like the baby, I don't know, the infant that I was entrusted with or that has suddenly arrived...I don't feel her like... it is difficult to connect the fact that she was in the belly and now she is there, now she is out. She looks almost like another baby.

After all, there is always this issue of being able to recreate this relationship. I have to understand that he's the one who was previously in the belly and now is out… and it is a bit, 'a little' weird.

The separation from the child is also something that the mothers had to address every day during infant hospitalization. The baby is not at home and the mothers feel that the baby do not exist when they leave the hospital.

While I'm here I only think of her and all the other thoughts are blocked…but especially at the beginning, every time I had to leave the hospital it was almost as if she does not actually exist.

It appears that the separation after delivery and continuous separation during infant hospitalization disturbed the ability of the mother to recognize the infant as her infant. In turn,

this separation affected not only the maternal possibility to parent the infant but also the possibility of these mothers to establish a bond with him/her.

Hanging by a thread

Once the baby is born, a period of concern and worry begun for the mothers. The mothers are in a highly charged and undefined situation in which anything can occur. The mothers do not feel free to be happy for the infant's birth because his/her medical condition is not stable.

The birth is not the beginning of something beautiful, but it is the beginning of concern. Not feeling the baby crying and seeing him full of tubes, for the mom starts something that has a question mark, where the anxieties are different and much stronger and heavier compared to a normal birth when the baby just cries and you just have to give him milk and change his nappy!

The mothers had the perception of hanging by a thread, always prepared to accept bad news regarding their baby's conditions.

There's a part of you that continues to hope, and another one, which is always there that tells you to be prepared for the worst. You should know that anything can happen, it is a bit difficult, is a bit too difficult.

The baby is perceived as being constantly at risk because of his medical conditions. Fears and worries are always present in these mothers' experiences. The fear that something could go wrong, that the child's condition could worsen, is always on the screen.

Julie is at the end presently, but it gives a lot of fear the fact that other complications may arise and therefore it is a little bit like a pendulum. Yes, she's right. No, no, she's bad. Yes, she's ok. Yes, she's sick.

The chronic anxiety associated with uncertainty also influenced their lives outside of the hospital environment. When at home, the parents relied on the telephone to maintain contact with the NICU and with the baby and parents reported the uncertainty and fear they experienced when the home telephone rang.

There is always the fear that they call us to tell us that there is something wrong. Even at night I wake up and look at the phone and see that no one called. You're always anxious until you see

that he has put on pounds, he eats alone. Until that time you always have anxiety that someone will call you. I'm never at peace.

This continuous state of worry affected the maternal ability to think of the future. The mothers do not allow themselves to imagine the infant in the future. Most of the mothers did not answer the question "how do you imagine the infant in the future?" and said that they cannot imagine him/her. The present is overwhelming, and they cannot think of the future.

I do not know… if I think of the future I say, maybe I'll get another blow, and this future will not come…for that reason, sometimes I think about it, it is impossible not to think about it, but I do not want to think too much of it because… I do have fear.

The emotional exhaustion that these mothers experience affects their relationship with the baby. It appears that the fear and worries are too overwhelming and do not allow the mothers to be happy for their infant birth and comfortably connect with him/her.

The lack of physical contact

Whereas the previous subtheme is more related to the perception of the baby as an at-risk infant, this theme is related to the effect on the mothers of seeing the baby surrounded by medical equipment and tubes in the NICU. This equipment is viewed as a physical barrier that keeps the infant away from the mother.

I do not understand why, between you and your child, there is this wall, because it is really a wall! It's as if they took him away from me.

Then, I saw him again and it was very tough for me. To see him in the incubator with assisted respiration was a bad moment for me because you see your own son hanging by a thread.

Particularly during the initial period after birth, physical contact for the mother is an important expression of attachment and a way of developing a parent-infant relationship. Mothers of premature infants cannot have this experience. During hospitalization, the baby is in the incubator and the mother can only watch him/her and touch him/her for limited amounts of time.

You see your child in a little box. I call the incubator that. He is in there and to pick him up you must ask because he is attached to the tubes.

The mothers reported having many difficulties in holding the baby because they must pay attention to the tubes. Interactions are not as spontaneous as they desire.

Now I'm not scared anymore to hold him, though before he looked so (...) I was not familiar with him. With a child so small… with the fact that he always had the mask and tubes, picking him up was really challenging.

The sight of the tubes and equipment around the baby enhanced the perceived impotence of these mothers. The mothers realized that they must wait and cannot do anything to help the baby.

Well, certainly seeing her there is not easy (she cries). Seeing her there like that… and I cannot do anything. I feel powerless. I can only wait.

Occasionally the appearance of the entire NICU overwhelmed the mothers.

You know he cannot get out of there, I know that this is the best thing for him, that it is saving his life…however, it is really a violence…the noises, the needles and all the other things, they do that to every baby… you know they are helping them but even though, you see suffering on the child's face.

In conclusion, the baby's appearance, different from the healthy, full-term baby that the mothers' had pictured during their pregnancy, and the environment where the initial mother-infant interactions occur influenced the perception of these mothers to have physical contact with their babies. In turn, this lack of physical contact resulted in an absence of psychological contact and a connection with the baby.

5.4.3 Theme 3: The relationship with the healthcare providers and external world

In such a moment of crisis, the support received from the external environment is fundamental. The mothers must maintain a frequent and intense relationship with the medical staff. This relationship is characterized by strong ambivalence. Clinicians and nurses are

figures simultaneously viewed as individuals who provide care and are barriers between the mother and child, as was shown in the "the loss of the parental role" subtheme. This theme is more related to the support that parents receive from healthcare providers. On one hand, the mothers perceived the medical staff as competent caregivers on whom they and the baby rely. On the other hand, mothers reported difficulties in interacting and communicating with them.

Furthermore, the mother's difficulty in gaining access to the maternity dimension clashes with the image of her as a mother who returns from the external world. This perception represents an additional barrier rather than acting as a facilitator.

This theme is articulated into three subthemes.

The support from medical staff

The mother and baby rely on the care of the medical staff. Some mothers described how the staff helped her by providing emotional support and making her feel safe during the delivery and hospitalization of the infant.

> *The positive aspect of the experience is that I felt very protected by the doctors, yes, I did. I felt a sense of security, safety, thanks to the doctor, the anesthetist, the midwife and to the entire department, both the staff of the delivery room and the one of neonatology. I knew I was in safe hands. I could hear the doctors close to me. They were doing everything that was possible to do, so to me, this fact by itself gives me a little bit of relief.*

> *Anyway, the good thing is the staff that maybe tells you that little sweet word or that little word of trust that you hold on to. It's the only thing I can cling to.*

A feeling of trust was obtained through the fact that the child received professional care by experts who were viewed as having control of their child's conditions. This trust eased the worry in the parents when they were not with their child, and it reduced their need to control the child's condition themselves, as was reported by this mother:

> *From a psychological point of view there was always the worry for the baby, but I knew he was here and I was there, and they called me immediately if something went wrong. The nurses are very skilled and I can see that they took care of the child, all children. This is the most positive thing. Because of that, I'm pretty relieved.*

Every action performed by the staff that can help mothers have better contact with the baby is widely appreciated. Caring for the child themselves with the assistance of the staff helped these mothers to overcome their fear of touching the child and was described as strengthening the parental identity. The following mother reported that it made her feel similar to a "normal mother":

When they gave me her to hold for the first time, I did not expect it. I thought she was too small. So, for three seconds (she cries)*, you feel almost like a normal mom!*

Moreover, this result emphasizes the importance of the quality of the relationship that the parents established with the NICU staff. A good relationship causes mothers to feel less overwhelmed, to entrust their baby to the staff and to recognize the function of healthcare providers as moderators and not as intruders between them and their infants.

Disorientation and the absence of communication

Through their behaviors, communication and interaction style, the medical staff can hinder more than help parents cope with the NICU experience. Many mothers complained of the difficulties they had in communicating with the medical staff. The mothers believed that the physicians do not have enough time to dedicate to them and do not feel free to ask questions or express their worries.

I'm almost always afraid to ask, especially when you see them so busy.

It is important for parents to be informed which nurse is responsible for their child and which physician is in charge during the hospital stay to know whom to direct questions to.

Definitely some more support would be really needed because you are left on your own. I am still struggling in this sense. So far, I do not understand who's following Jack, I don't understand what kind of ideas they have, which is the procedure… I do not understand who drives the decisions.

The mothers recognized the emotional crisis they were experiencing and complained of the absence of emotional support from the NICU staff.

I feel it lacks a little psychological support… someone that tells you how the situation evolves. You're a bit disoriented. It is true that the doctor comes by all day, but they don't really explain that much. You always stay a bit afraid with your thoughts and concerns.
We live in a moment of apprehension, and it is normal for the first 2 or 3 days that you want to see the kids, you want to know about them. But there is not a person who reassures you, one who tells you something.

Moreover, this subtheme, with the previous subtheme, emphasizes the ambiguous relationship that mothers had with their healthcare providers. On one hand, the mothers desired to have more control of their babies. On the other hand, the mothers recognized the importance of the medical staff's role as support for the baby and themselves. The subtheme "hanging by a thread" emphasizes that the strictly medically focused environment of the NICU affected the mothers' well-being. In this situation, the mothers also explicitly request attention for themselves.

Being special mothers

The mothers represented themselves as special mothers. It was noted above that the mothers feel different from the mother of a full-term infant. Moreover, the mothers recognize the differences between their experiences and those that they are expected to live. Simultaneously they do not feel understood by the external world. Interactions with other people are difficult.

This mother reported that other people have difficulties in understanding the real meaning of the experience of having a preterm infant. This absence of understanding from others contributed to the feeling of isolation.

… everyone tells me, "congratulations you've given birth", yes, I did, but I do not have him here!

Explaining it to the people outside is also very difficult. However, they do not understand it and so they do not realize what having a premature child actually means, that there is a set of problems after all. It's something pathological, but it's not only about the weight, there are so many other things to be concerned about.

However, this feeling of being “special mothers” facilitated the development of close relationships with other mothers in the NICU. These mothers must share their experience with someone else who could understand its profoundness. The following quote shows that the presence of other mothers and opportunity to interact and match experiences is meaningful:

You can share with other moms what you have experienced. This is a great help because the first thing that happens otherwise is that you blame yourself.

The ability to hear other stories, successful or unsuccessful stories, provided the mother with useful and more realistic comparisons. Occasionally, this comparison could help mothers entertain hope regarding her baby’s possible outcomes.

Then, when I'm there taking out the milk, there is the encounter with the other girls, the different experiences. When you hear other experiences you feel, you feel lucky that everything went well, if they made it, it means we will make it too…

Preterm motherhood is not a well-known experience and the absence of knowledge of people surrounding the parents does not help these mothers who previously felt different from what was expected of a mother. The role of mutual support between mothers in the NICU is important and is occasionally crucial. Associating themselves with the other “special mothers” in the NICU helped these mothers feel less isolated.

5.5 Discussion

This qualitative study, using a semi-structured interview, explored the early experiences of 30 mothers who had preterm infants. These interviews sought an in-depth explanation and understanding of the inner psychic world of emotions, thoughts and fantasies of the mothers.

The analysis and interpretation of the data identified that the parental experiences of premature infant mothers, beginning with pregnancy to infant birth and hospitalization, consisted of several complex and challenging problems, which the mothers were not prepared for, but nonetheless, had to live through (Howland, 2007). Whereas these problems are diffusely recognized, this finding added that these experiences could have a revealing effect on the development of the representation of the woman as a mother and the bond with the infant.

Stern (1995) wrote that the mother must transform and reorganize her self-identity in the new constellation of motherhood. In essence, the new mother must shift her center of identity from daughter to mother, from wife to parent, from one generation to the subsequent one. My results described that after premature birth, these changes are more difficult to realize. The normal transition to parenthood is interrupted. The unexpected birth of the baby and separation from him/her occurred before the mothers were psychologically and physically prepared (Padovani et al., 2008).

Although on the threshold of a changing status from expectant to actual parent, these mothers believe they are in limbo because they had not effectively mastered the psychological emotions and the physical, social and psychological roles and responsibilities associated with parenthood. For these mothers, there is a strong difference between "being a mother" and "feeling like a mother" on a deep psychological level (Watson, 2010).

Lupton and Fenwick (2001) emphasized that "good" mothers are expected to "be there" for their children, place their infant's needs above their own and deal cheerfully and patiently with the privations that caring for a baby entails. Mothers of premature infants failed to protect their babies inside their womb until the end of pregnancy (Brady-Fryer, 1994). Moreover, the mothers are not able to protect the baby after delivery because they cannot take him/her home. The mothers can "be mothers", but only for a limited amount of time during the day, and even when they are allowed to stay with the baby, they do not feel as though they can do what a mother is expected to do to care for the infant. This inadequacy leads to feelings of failure and guilt consistent with what reported in previous studies (Lupton & Fenwick, 2001; Tracey, 2000).

From these mothers' narratives, a sense that the situation was out of their control emerged. Consistent with Black and colleagues (2009), this sense of things out of control related to the medical aspect of delivery, the physicians decided the baby was to be born before the mother was prepared to. At the same time this sense is present throughout all the infant hospitalization experiences. Beginning from the early stage of infant hospitalization, mothers experience helplessness and powerlessness because they are forced into a passive role of a secondary caregiver with minimal control over their infant and must ask for permission before doing anything with him/her. The parents relied on the neonatal nurses' expert knowledge to care for their infant because they lacked the necessary knowledge and skills. These mothers believe

that they are not competent caregivers, and every effort of theirs is not enough or not comparable with what the nurses and doctors can do (Holditch-Davis, Bartlett et al., 2003).

The normal process of knowing the baby and knowing what is best for the baby, which every mother experiences, is disturbed. These worries are also projected into the future when the mothers imagine their life after the infant's hospital discharge; we can also suppose that these worries will influence maternal responsiveness and sensibility to infant's signals (Flacking et al., 2007).

The birth and subsequent hospitalization of the premature infant affected not only the representation of the woman as a mother but also the development of the bond with the child as was reported by other studies (Meijssen et al., 2011; Shah, Clements, & Poehlmann, 2011). The mothers expressed concerns related to the infant and early parental attachment. The mothers consider the bond they feel with the infant as the absence of significant attachment and different from their idea of a normal experience of maternal love (Black et al., 2009).

Black and colleagues (2009) reported that mothers of premature infants must recognize that they are now, unambiguously, "a mother", and from then on must recognize that they are the mother of "this specific infant". Consistent with this result, our mother narratives show how the sudden separation from the infant after delivery had a strong effect on the ability of the mothers to connect the baby they held in their womb to the baby in the NICU, which is a baby that looks different from the healthy full term infant that the mother expected.

Both Bowlby's theorization and the psychoanalytic perspective emphasized how maternal bonding is characterized by a unique mental set and behaviors that are directed to maintain the mother's physical and psychological proximity to the child (Bowlby, 1973, 1990; Winnicott, 1971). Parental involvement, beginning from initial contact with the newborn, has the function to facilitate the process of knowing the child and has been shown to promote parent-infant attachment. In turn, parental involvement helps to establish confidence in parents to take care of their infant in the future. Physical and psychological proximity are interrelated and influence one another. Mothers of premature infants do not experience this physical proximity with their child for a long period after delivery (Feldman et al., 1999). The absence of physical contact appears to be a crucial obstacle in the process of relationship development with the baby. The mothers feel discouraged by the medical equipment attached to the baby's body and

by the public place in which they must remain with their baby (Lundqvist, Westas, & Hallstrom, 2007).

The mothers cannot exhibit crucial attachment behaviors and simultaneously cannot recognize the typical attachment behaviors in the infant. The mothers cannot remain with the child when they believe he/she needs them; for example, the mothers cannot soothe their infant when he/she cries and therefore do not directly experience the positive effect of their caregiving behaviors on the newborn.

This result is consistent with many studies that emphasize the role of mother-infant contact and proximity in the development of attachment in premature infant groups (Brisch, Bechinger, Betzler, & Heinemann, 2003; Cox, Hopkins, & Hans, 2000; Feldman et al., 1999; Lundqvist et al., 2007).

One key emerging factor relevant to this process is the marked degree of uncertainty parents experience in the NICU and at home. This experience involved living on an emotional rollercoaster with chronic insecurity and feelings of powerlessness (Watson, 2010). Mothers feel like they are hanging by a thread, and the situation is constantly stressful and overwhelming. These feelings do not allow mothers to relax and cease worrying because they view their infants as vulnerable and do not allow themselves to be happy with their infant's birth. The mothers are afraid to approach the infant and fear handling him/her, and a portion of them is always prepared to be separated from the infant, hear bad news or expect that complications occurred (Meijssen et al., 2011). Our mothers described anxiety related to waiting for bad news from the hospital, which was consistent with reports by Watson (2010).

According to Flacking, Ewald and Starrin (2007), this profound emotional exhaustion contrasts with the social expectation of being "a happy new mother" and contributes to the feeling of isolation reported by these mothers.

These mothers identify themselves as "special mothers" of "special infants". This feeling of diversity derives from the different situation in which the transition to parenthood occurs. The mother cannot take her baby home and cannot show him/her to relatives and friends. Only parents are allowed to enter the NICU, and friends and relatives cannot see the baby or NICU environment. In turn, this restriction could enhance the difficulties that mothers reported when sharing their experiences with others. To cope with this, mothers tend to avoid contact with individuals they believe will not understand. This avoidance further contributes to their sense

of isolation. Notably, the support that mothers obtain by sharing their experience with other mothers in the NICU emerged as a crucial factor (Affleck & Tennen, 1991).

Moreover, among these factors, these findings emphasize how parenting a preterm infant in the NICU is more than the relationship of the mother with the newborn. Instead, this process unavoidably involves healthcare providers (Meyer et al., 1993). The relationship with the medical staff emerged as a relevant theme and is characterized by strong ambiguity.

Because the mothers recognize their absence of knowledge and understanding of the role of the staff as co-caregivers, there is a desire to learn how to care for the infant. The mothers tend to perform what they can to increase the opportunity to be taught by the staff, and they rely on the staff's opinions in influencing their sense of being competent mothers (Jones et al., 2009).

Parents do their best to develop an alliance with the nurses, in which they share the sense of working together in the best interest of the infant. When the parents feel that the child is receiving the appropriate professional care by experts, they feel free to behave in a relaxed manner with their child. Moreover, this freedom reduces their need to control the child's condition themselves. When the mothers trust the nurses' work, it is less difficult to relay the infant to them when they leave the NICU; thus, they are less worried.

However, consistent with Watson's (2010) and Holditch-Davis and Miles' (2000) results, rather than facilitating parent-infant closeness and promoting the development of parental sensitivity and attachment, the mothers perceived some neonatal nurses behaviors as limiting parental involvement in their infants' care. When mothers perceive the nurses' role more as an interference than as a mediator in the relationship they have with their infant, they feel excluded by infant care.

It is important for parents to be informed of the nurse and in-charge physician that are responsible for their child during the hospital stay to know whom to discuss questions with. Many mothers express a deep need to receive information regarding their child's medical condition, and they feel that it is their responsibility to determine this information. Simultaneously, mothers are afraid to interrupt the medical staff with questions. This phenomenon creates confusion and contributes to maternal anxiety and worry (Hall et al., 2012).

However, mothers require more than information and technical support. It is important that the staff cares for the child, as these mothers reported, but it is equally important for the

parents to receive attention and support through consolation and questions of how they feel. Pinelli (2000) emphasized that, particularly during the acute crisis phase after the birth of a premature infant, social support is crucial to psychologically recover from such a stressful and traumatic experience.

This result, together with the results from other studies, emphasizes that when parents were involved in infant care, allowed proximity, communicated obviously and openly, and formed an interactive rapport with nurses they feel safer, gain control over the situation, more satisfied and confident in their parenting roles and more connected with their infants (Jackson, Ternestedt, & Schollin, 2003; Obeidat, Bond, & Callister, 2009).

In conclusion, this study contributes a characterization of the thoughts and feelings of mothers, which may be expressed in the process of a guided interview, and qualifies the maternal emotional universe after the birth of a preterm infant and the experience of his/her hospitalization. These findings are consistent with previous research and further appear to provide a different perspective of the overall early parental experience following the birth of a preterm infant and interpret the experiences within the transactional model of development (Sameroff, 2009; Sameroff & Chandler, 1975). The transition to parenthood for mothers of preterm infants is a product of several dynamics. It is the result of the complex interplay between the characteristics of the infant, mother and environment, particularly the NICU. In turn, these factors affect the process over time beginning with pregnancy to preterm delivery and infant hospitalization. From these findings, the whole process that influences the development of the mother-premature infant relationship emerges.

The role of the mother is crucial; prematurity is more than an experience that only referred to infants' vulnerability. In particular, the relationship with the environment in which the first interactions with the infant occur has a strong effect on the development of maternal representation. The identification of these thoughts and feelings provides much information for the proper planning and provision of the appropriate preventive psychological support with the intention to help mothers and preterm infants.

Listening to mothers' accounts of the experience, we could feel their sense of urgency and need to recount every detail of the experience. They needed to share their excitement and their worries and, as noticed by many of them, the interview was the first moment they had after

infant's birth to stop and recollect their memories and consolidate the experience in a warm and welcoming situation. As interestingly reported by Padovani and colleagues (2008), also in their study, although not approached in the interview script, mothers of preterm infants, feeling accepted during the interview situation, enjoyed the opportunity to express their reactions and feelings about the experience of having a premature baby and the consequent hospitalization. If administered with parents during infant hospitalization, this kind of interviews have in addition the utility in determining which kind of psychosocial support services might best be provided and would help in identifying "at-risk" situations (Meyer et al., 1993).

CHAPTER 6
STUDY 2
THE ANALYSIS OF MOTHERS-PREMATURE INFANTS INTERACTIONS AT 3 AND 6 MONTHS

The social nature of developmental experiences is considered central for the child to grow and thrive (Sroufe, 1997). As underlined by Sameroff "individual development remains a co-construction of the child's self-regulatory capacities and the social word's other-regulatory capacities that facilitates or impedes this development" (2009, p. 11).

This theorization, consistent with the attachment theory and the more recent findings in infant research, empathizes the infant's need to experience reciprocal, affectively involved interactions with the parent to become interested in social interactions and to develop secure attachment relationships (Bowlby, 1988; Cassidy, 1994; Sroufe, 1997). Through the recurring dyadic interactions, the mother and the child organize their individual styles and dyadic patterns which potentially constrain qualities of future interactions (Cicchetti & Toth, 1997) and are fundamental in determining the development of infant's emotion regulation skills in the following years (Sroufe, 1997).

During the first year of life the mother and the infant create a system of mutual regulation (Weinberg & Tronick, 1996). When interacting with the mother, the infant expresses his/her emotional states and the mother in turn interacts and responds to the emotional communication of her infant, tuning into and regulating his/her emotions (Riva Crugnola, Gazzotti, & Spinelli, 2012; Sameroff & Fiese, 2000; Tronick, 2007; Tronick, 1989).

Tronick (Tronick, 2007) stated how mother-infant communication appears to be characterized by moments of shared emotion states (matches) alternating with non-shared emotion states (mismatches). The author found that mothers and infants spend most of their playtime in such mismatching states when the infant and the mother are in different emotion states (e.g., the infant smiles at the mother and the mother looks away with a neutral facial expression). However, the author underlined that during normal mother-infant interactions the mother and the infant, after failing to share their actions and emotions, effect successful repair,

leading to the emergence of new matched emotion states (Cohn & Tronick, 1989; Gianino & Tronick, 1988).

Several studies have shown that in at-risk dyads this affective regulation could be compromised as it happens for example in depressed mothers, insecure attached mothers and mothers who used cocaine dyads (Beeghly & Tronick, 2006; Cohn, Matias, Tronick, Connell, & Lyons-Ruth, 2006; Riva Crugnola, 2012). Furthermore various studies have shown how the styles of emotion regulation characterizing mother-infant interaction and especially the regulatory strategies the infant develops in interaction with the mother during the first year, predict infant's subsequent attachment patterns and child emotional development (Braungart-Rieker, Garwood, Powers, & Wang, 2003; Evans & Porter, 2009; Jaffe et al., 2001; Malatesta et al., 1989; McElwain & Booth-LaForce, 2006). Beebe and colleagues (2010) in a recent study also stressed the importance of mother and infant interactive contingency with respect to the quality of the infant's subsequent attachment.

Whereas interactions between parent and infant characterized by mutual engagement and affective reciprocity enhance the child development, maladaptive interactions place the infant at risk for later emotional, cognitive, and behavioral difficulties (Lyons-Ruth & Block, 1996).

For these reasons the study of the development of mother-infant interactions and mutual emotion regulation is a major focus of study in child development, especially with regard to at-risk populations.

Infant preterm birth is an example of a biological and social condition of vulnerabilities that can have the effect of increasing the risk for negative outcomes if combined with other vulnerabilities. Preterm infants differ developmentally from full-term infants and have behavioral characteristics that may cause them to be more difficult partners in dyadic interactions. Many factors, both related and unrelated to prematurity, influence these potentially difficult interactions (see Chapter 3). In addition the highly technical environment, the NICU, where early interactions between the mother and her infant take place may represent an obstacle to the formation of the relationship as intimacy can only be created with great effort (see Chapter 2). Mothers have only little opportunity to be in proximity and in contact with the baby. This may obviously affect their ability to understand the infant's interactive behaviors and subsequently their responsiveness (Feldman et al., 2003; Ferber et al., 2005).

Although, previous researchers found that prematurity affects mother-infant synchrony during face-to-face interactions (see Chapter 3) little is known about the quality of dyadic processes such as matching and mismatching in preterm dyads.

Only few studies micro-analytically analyzed the development of emotion regulation in preterm infants using Tronick's approach and all of them during the Still Face procedure. Hsu and Jeng (2008) compared 2 month old Taiwanese preterm and full-term infants during the Still-face procedure and found that preterm infants became distressed faster and stayed in a negative state longer than full-term infants showing that preterm infants may be less competent in regulating their distress. Contrariwise no differences in infant negative affect were found by Segal and colleagues (1995) between groups of black preterm and full-term mother-infant dyads.

At 6-9 months of infant age Montirosso and colleagues (2010) found differences between preterm and full-term infants' regulatory behaviors. Preterm infants were more likely than full-term infants to use distancing (e.g., by turning away, twisting, or arching) from their mothers interpreted as a sign of more stress experienced. At the same time preterms showed more social monitoring during the reunion episode compared to full-term infants. The authors supposed that due to their less capacity for self-regulation, as it is also demonstrated in Jean and Stack's study (2012), preterm infants used social monitoring as a compensatory strategy to cope with the stress of renegotiating the interaction during the reunion episode.

Other studies confirmed the crucial role of the mother in improving self- and ethero-regulatory abilities in the infant also in preterm infant samples. It was found that maternal responsiveness was strongly associated with the amount of very low birth weight positive infant affect, but not with negative infant affect (Erickson & Lowe, 2008) and maternal touch was associated with infant's self-regulatory behaviors (Jean & Stack, 2012).

At the same time maternal and preterm infant regulation processes affect the quality of infant's attachment as shown in Fuertes and colleagues' study (2009). These authors reported that preterm infant's ability to regulate stress during the Still-face paradigm played, with maternal sensitivity, a crucial role in predicting infant-mother attachment (Fuertes, Lopes-dos-Santos, Beeghly, & Tronick, 2009).

Taken together these findings suggest that preterm infants have different regulatory and interactive capacities than full-term infants. Very little attention has been given to other factors

that can influence emotion regulation processes in preterm infant dyads and their trend over time. Our understanding of the developmental pathways of dyads' with children born preterm interactive quality may be limited by not including both clinical and socio-familiar factors as well as not considering how the mother and the infant influence each other. Furthermore the ability of co-regulation can change during time when developmental capabilities and demands are different (Olson & Lunkenheimer, 2009).

Consistent with these findings the main goal of this study was to analyze mother-premature infant free-play interactions during the first half of the first year of infant's life jointly considering mother-infant dyadic and individual styles. This with the aim to outline the characteristics of mothers' and premature infants' individual and dyadic interactive styles and the variables that can influence them.

6.1 Study goals and hypothesis

In light of the importance that early relationships have on child subsequent development and what is known about preterm infants affective behaviors, the aim of this study was to examine the individual and dyadic styles of emotion regulation and play observed in mother-premature infant dyadic interactions at 3 and 6 months of infant's corrected age.

For this purpose we examined:

a) The relative duration of maternal and infant behaviors;
b) The relative duration of mother and infant interactive individual affective states (positive, neutral and negative);
c) The relative duration of dyadic coordinated affective states (matches) and not-coordinated affective states (mismatches) of mother and infant.

To this end the aim of this study was to investigate:

- The differences in maternal and infant behaviors, individual and dyadic affective states between mother-premature infant and mother-full-term infant dyads at 3 and 6 months of infant's age (corrected age for preterm dyads);
- The stability of such differences, if present, between 3 and 6 months of infant's age (corrected age for preterm dyads);

- The role of maternal state of mind regarding attachment as a protective or risk factor between infant birth status and the development of mother-infant emotion regulation at 3 and 6 months of infant's age (corrected age for preterm dyads);
- The role of maternal and infant characteristics as protective or risk factors in the development of mother-premature infant emotion regulation at 3 and 6 months of infant's corrected age.

On the basis of the above considerations we expected that preterm infant dyads significantly differ from full-term infant dyads not only with respect to infant behaviors but also with respect to maternal and dyadic behaviors and affective states. We also expected to find a significant influence of infant and maternal characteristics on the quality of preterm dyads interaction and emotion regulation.

6.2 Methods

6.2.1 Participants

As shown in Table 1 (Chapter 4; p. 43) participants of this study come from different hospitals in the north and center of Italy.

The sample included 22 mother-premature infant dyads with infants born between the 28 and the 32 week of gestation.

Participants from the different data collection sites didn't differ for what concerns maternal and family variables. Preterms infants from NICU 1 and from NICU 2 didn't differ with respect to gestational age, weight at birth, length of hospitalization.

The control group included 20 mother-full-term infant dyads.

Characteristics of the whole sample are described in Table 5. No multiples were present in both the samples. In the preterm group 7 mothers (31.8%) experienced previous abortions. All the mothers except one were Italian.

	Preterm Group (N = 22)	Full-Term Group (N = 20)
	Mean (SD)	Mean (SD)
Mother age (years)	36.1 (4.3)	33.5 (3.8)
Mother education (years)	14.8 (3.5)	15.1 (3.2)
Mother living with the partner (%)	81.8%	97%
Infant gender (%)	F = 40.9%	F = 38.5%
Firstborn child (%)	59.1%	62%
Preterm infants:		
Birth-weight (g)	1285 (6459)	
Gestational age (weeks)	30.4 (1.9)	
Hospitalization (days)	58.1 (28.5)	

Table 5 Study 2. Demographic characteristics of the participants.

6.2.2 Procedure

Socioeconomic, demographic and family information were collected through an interview with parents.

A history of hospitalization form was completed for preterm infants by reviewing medical records. Data were collected from mothers on their pregnancy history, employment and educational status.

At 3 months of infant age (corrected age for preterm infants) the Adult Attachment Interview (George, Kaplan, & Main, 1985) was administered to the mothers in order to assess the state of mind regarding attachment.

At 3 and 6 months of infant age (corrected age for preterm infants) mother-infant dyads were video-recorded in a laboratory (infant mean age =3.17/6.21; SD =.91/.80). The laboratory was a suitable furnished play room equipped with a small mattress on which the mother and the infant could sit or lie and a number of toys appropriate for infant age. The camera was positioned inside the room in front of the dyad and it framed the mother and the infant, who was sitting on a cushion, sideways. In this way the behaviors and the expressions on the faces of both members of the dyad were visible and could be coded. By using this method 1% at 3 and 6 months of mothers' behaviors and 2.01% of infants' behaviors at 3 months and the 1.01% at 6 months resulted unscorable. The mothers were asked to play and interact with the infant as they would normally do at home.

The video-recordings lasted around 5 minutes (M = 5.08; SD = 0.22) and during this time the mother-infant dyad was left alone in the laboratory room.

6.2.3 Measures

Neonatal risk index. Infant birth weight and gestational age were collected from infant NICU medical records. These variables were highly correlated, (r = .797, p = .006), so we chose one variable to use in the analyses. We chose gestational age because in the literature is reported as a more significant variable in influencing preterm infants' development (Korja, Maunu et al., 2008; Poehlmann, Schwichtenberg, Bolt et al., 2011). To create a neonatal health risk index, as used in previous research with preterm infants (Poehlmann, Schwichtenberg, Bolt et al., 2011), we summed 9 medical variables, each dichotomized into 1 if present and 0 if absent: apnea, respiratory distress, chronic lung disease, gastro esophageal reflux, multiple birth, supplementary oxygen at NICU discharge, apnea monitor at discharge, 5-min Apgar score less than 6, ventilation during NICU stay. Higher scores indicated more neonatal health risks. This variable was calculated only for preterm infants. Length of hospitalization in days was also used as an index of preterm infants' risk.

Family SES risk. An index of maternal socioeconomic risk was calculated for preterm infant dyads. This index was calculated by summing the presence of the following risk factors: both parents unemployed, both parents didn't complete high school, single mother, 4 or more dependent children in the home. Scores ranged from 0 to 4, with higher scores reflecting more risks.

Adult Attachment Interview (Main & Goldwyn, 1994-98). AAI is a semi-structured interview which explores the interviewees' relationships with their parents as children, including early separation and means of comfort seeking; it also investigates how the subject reflects on the reasons behind their parents' behavior and the change in the parental relationship over time (George et al., 1985). The interviews were audio-taped and transcribed verbatim. According to the Main and Goldwyn (1994-98) coding system each interview was assigned to the following categories: Secure/Autonomous (F), Dismissing (Ds), Preoccupied (E), Unresolved/Disorganized (U). The interviews assigned to the U category received a

secondary score of secure/autonomous, dismissing or preoccupied. For the purpose of this study maternal attachment models were dichotomized into secure and insecure.

Coding system of infant and mother behavior. The coding system used to analyzed mother-infant interactions was based on the Infant and Caregiver Engagement Phase (ICEP) (Weinberg & Tronick, 1999). This system evaluates the behavior of the mother and the infant on the basis of the emotions expressed, on gaze direction and on vocalization and verbalization in order to assess the quality of the participation of both partners in the interaction. Since the original coding system was created to evaluate mother and infant interaction relating to the Still Face paradigm, a paradigm which does not involve the use of objects, we introduced new categories with the aim, in particular, of exploring the way preterm and full-term infants and their mothers interact with objects. The coding system modified in this way was ideated and used in previous published studies by Prof. Riva Crugnola and her research group (Gazzotti, Spinelli, & Riva Crugnola, 2011; Riva Crugnola, 2012; Riva Crugnola, Albizzati, Caprin, Gazzotti, & Spinelli, 2009; Riva Crugnola, Caprin, & Spinelli, 2008; Riva Crugnola, Spinelli, Gazzotti, & Ierardi, 2011). The categories added which are not present in the original coding system, related to the infant's orientation towards objects offered by his/her mother or chosen by him/her and to the mother's involvement in the play chosen by the infant and her offer of objects to the infant (Table 6).

Infant codes	*Negative Engagement*	Infant is negative, protesting with facial expressions of anger, annoyance, often with crying or withdrawn passive and minimally engaged with the mother and the environment.
	*Orientation to Objects Offered by the Mother**	Infant is looking, touching, playing with objects offered by the mother.
	*Orientation to Objects Not Offered by the Mother**	Infant is looking, touching, playing with objects not offered by the mother.
	Orientation to Environment	Infant is visually exploring the setting without focalizing attention on any specific object.
	Social Monitoring	Infant's attention is directed towards mother's face. He/she is looking at her.
	Social Positive Engagement	Infant is displaying facial expressions of joy, astonishment and smiles. SPE is considered play with or without objects, but with social play.
	*Allows Caregiving **	Infant lets the mother comfort him/her while crying or annoyed.
	Unscorable	Infant's face is obscured (e.g. his/her face is covered by the mother's body or is outside the view of the camera) or the infant is asleep.
Mother codes	*Negative Engagement*	Mother is negative, intrusive towards the infant's physical space, activities and objects, hostile or withdrawn (minimally engaged with the infant's activities).
	Non-infant Focused	Mother is not attending to the infant or to the infant activities.
	Social Monitoring	Mother is looking at the infant and his/her activities.
	Social Positive Engagement	Mother is interacting with the infant through facial expressions of joy and interest, with positive vocalizations, motherese and social play.
	*Offer of Object **	Mother is offering a new object chosen by her to the infant.
	*Involvement in the Play **	Mother joins in the game with the object chosen by the infant.
	*Call for Infant's Attention**	Mother is trying to draw the infant's attention to her or to an object (ex. calling the infant, shaking the object, making noises).
	*Caregiving**	Mother is responding to the infant's uneasiness by nursing or comforting him/her, or caressing or kissing him/her with a neutral tone.
	Unscorable	Mother's face is obscured (e.g. her face is covered).

Table 6 Coding scheme of infant and maternal behaviors.
Note: Categories with an asterisk were not provided in the ICEP (Weinberg & Tronick, 1999).

Maternal and infant behaviors were coded micro-analytically second by second and on an event-coding basis with the program The Observer (Noldus, 1991). The ODS program allowed the transformation of the coding in order to analyze it with the program GSEQ (Bakeman & Quera, 1995, 2000). Coding was continuous and occurred for every instance of a behavior. The codes were exhaustive and mutually exclusive. Infant and maternal behaviors were coded separately and at different times by the same researcher. It was decided to use the same coder given the interactive characteristic of many codes (e.g. those regarding play with objects): it was therefore important that in coding a member of the dyad, the researcher also bore in mind the behavior of the other. Another coder, operating independently of the other, coded the behaviors of the mothers and infants of 20% of all the dyads. The rate of agreement was calculated according to Cohen's Kappa coefficient (Cohen, 1960) and was 0.91 for the observation of maternal behavior and 0.89 for the observation of infant behavior. The two raters were blind to infant state of birth.

Affective States. In order to evaluate matching and mismatching of affective states within the dyads, we created new codes, using the GSEQ program (Bakeman & Quera, 1995), combining the codes of the coding scheme previously used according to the affective state they represented within three categories: neutral, positive, and negative affective states (Table 7).

AFFECTIVE STATES	CODES
Infant Positive	Social Positive Engagement, Orientation to Objects Not Offered by the Mother, Orientation to Objects Offered by the Mother
Infant Neutral	Social Monitoring, Orientation to the Environment, Allows Caregiving
Infant Negative	Negative Engagement
Mother Positive	Social Positive Engagement, Offer of Object, Involvement in the Play
Mother Neutral	Social Monitoring, Caregiving, Call for Infant's Attention, Non-infant Focused
Mother Negative	Negative Engagement

Table 7 Affective states definitions.

In particular, we assigned Social Positive Engagement and infant's relative to play with objects behaviors to Infant Positive code, reasoning that such orientation was activated in the former case by positive engagement towards the mother and in the latter case by interest and curiosity about the objects. We assigned Social Monitoring behavior to Infant Neutral code, in that it presupposes (Weinberg & Tronick, 1999) that the infant is oriented towards the mother's face without expressing positive emotions (see Table 7). For the same reason we assigned Allows Caregiving to Infant Neutral code. Orientation to Environment was assigned to Infant Neutral code, in that such behavior entails visual exploration of the environment without attention and interest being focused on a particular object (Weinberg & Tronick, 1999). For the mother, we assigned to Mother Positive code Social Positive Engagement and behaviors relating to the play with objects, considering them to be ways of positive engagement with regard to the infant mediated by toys and objects. We assigned Social Monitoring and Call for Infant's Attention and Caretaking behavior to Mother Neutral code, as these entail neutral attention towards the infant. The Unscorable category was not included in the affective states.

We then distinguished positive, negative and neutral matched affective states (match) and mismatched affective states (mismatch). According to Tronick (Tronick, 2005, 2007), match is understood as the extent to which mother and infant share joint negative, neutral, or positive

states at the same moment in time (Mother Positive/Infant Positive, Mother Negative/Infant Negative, Mother Neutral/Infant Neutral); mismatch is defined as any non-shared dyadic state in which the mother and the infant are not in the same state of engagement (Infant Positive/Mother Negative, Infant Positive/Mother Neutral, Infant Negative/Mother Positive, Infant Negative/Mother Neutral, Infant Neutral/Mother Positive and Infant Neutral/Mother Negative).

6.3 Data analyses

A specific program for sequential analysis, GSEQ (Bakeman & Quera, 1995), was chosen to process data resulting from behavior coding. This program also allows statistics to be calculated in relation to the duration of both maternal and infant behavior and to behavior occurring concomitantly between the two partners. Relative durations of maternal and infant individual and dyadic behaviors and affective states were calculated. The Unscorable code was not included in the analyses. Inferential tests were also used and, for this purpose, the statistic packet SPSS/PC version 20.0 was employed.

In order to select the statistical model that would at best fit the data at hand, the normality of the variables under study was preliminarily subjected to a series of tests. The review of the values of skewness and kurtosis, along with the results of the normality test of Kolmogorov-Smirnov and Shapiro-Wilk, evidenced that the distribution of the data collected was non-normal. Exploring the histograms of the variables we noticed that the relative durations were distributed similar to a Poisson distribution. Since the Poisson distribution is defined only for frequencies data we hypothesized that the distribution was a Tweedie. The analysis of the Akaike index confirmed this hypothesis and analysis were carried out with the generalized linear models function assuming the Tweedie distribution. The generalized linear models allow to build regression-type models of data when the distribution of the dependent variable is non-normal (Lindsey, 1997).

Descriptive statistics and the tests' results are reported in the tables.

The first analyses concerned the main effects of groups (preterm/full-term dyads) and the interaction between groups and time (3 months/6 months) with all the individual behaviors, individual affective states and dyadic coordinated and non-coordinated affective states as dependent variables.

The generalized estimating equations were used to account for the repeated measure design.

We described results concerning the differences between the two groups at 3 months and separately differences at 6 months. Consequently the effects of the interaction factor are described with the aim to see if these differences are stable or change over time across the groups.

Lastly, several regression models, only in the preterm dyads group, were conducted to explore if any of the infant and maternal variables were significant predictors of individual affective states at 3 and 6 months of age.

6.4 Results

6.4.1 Differences between preterm and full-term infant dyads

Tables 8 and 9 reported each group's relative duration of all the behaviors, the individual and dyadic affective states at 3 months of infant's age (corrected for preterms). Tables 10 and 11 reported relative duration statistics at 6 months of infant's age (corrected for preterms).

		Preterm dyads (N = 22)		Full-term dyads (N = 20)			
		M	SD	M	SD	X^2 (df)	*p*
Infant codes	*Orientation to Objects Offered by Mother*	.366	.169	.290	.143	2.00(1)	.158
	Orientation to Objects Not Offered by Mother	.057	.075	.130	.164	4.51(1)	.034*
	Orientation to Environment	.186	.129	.201	.139	.16(1)	.690
	Social Monitoring	.204	.149	.142	.105	3.08(1)	.080
	Allows Caregiving	.002	.007	.063	.069	26.75(1)	.000***
	Negative Engagement	.117	.122	.101	.123	.21(1)	.644
	Social Positive Engagement	.064	.082	.041	.048	1.56(1)	.211
Mother codes	*Social Positive Engagement*	.207	.139	.159	.117	1.52(1)	.217
	Involvement in the Play	.061	.086	.176	.123	10.88(1)	.001**
	Offer of Object	.419	.192	.172	.132	18.92(1)	.000***
	Caregiving	.070	.067	.179	.093	14.69(1)	.000***
	Non-infant Focused	.040	.037	.062	.047	2.67(1)	.102
	Social Monitoring	.164	.117	.197	.125	.92(1)	.337
	Call for Infant's Attention	.010	.015	.043	.039	12.97(1)	.000***
	Negative Engagement	.027	.047	.006	.021	4.53(1)	.033*

Table 8 Relative duration of preterm/full-term infants and mothers behaviors at 3 months, differences between the groups.
*p<.05, ** p<.01 *** p<.001

		Preterm dyads (N = 22)		Full-term dyads (N = 20)			
		M	SD	M	SD	X^2 (df)	*p*
Individual affective states	*Infant positive*	.490	.189	.475	.215	.06(1)	.814
	Infant neutral	.393	.180	.421	.189	.26(1)	.611
	Infant negative	.118	.122	.103	.124	.17(1)	.684
	Mother positive	.688	.169	.512	.145	12.39(1)	.000***
	Mother neutral	.285	.146	.483	.148	15.15(1)	.000***
	Mother negative	.027	.047	.006	.021	4.53(1)	.033*
	Match	.620	.101	.628	.137	.05(1)	.828
Dyadic affective states	*Infant positive – Mother positive*	.419	.186	.343	.164	1.99(1)	.159
	Infant neutral – Mother neutral	.172	.124	.285	.154	7.12(1)	.008**
	Infant negative – Mother negative	.007	.011	.000	.002	6.42(1)	.011*
	Infant positive – Mother neutral	.065	.040	.132	.113	10.50(1)	.001**
	Infant positive – Mother negative	.007	.021	.002	.007	1.84(1)	.175
	Infant neutral – Mother positive	.211	.098	.132	.084	7.37(1)	.007**
	Infant neutral – Mother negative	.013	.035	.003	.013	1.76(1)	.184
	Infant negative – Mother neutral	.050	.071	.069	.075	.74(1)	.390
	Infant negative – Mother positive	.056	.060	.033	.065	1.48(1)	.225
	Mismatch	.380	.101	.372	.137	.05(1)	.827

Table 9 Relative duration of individual and dyadic affective states and total match and mismatch of preterm/full-term dyads at 3 months.
*p<.05, ** p<.01 *** p<.001

6.4.1.1 Relative duration of mother and infant behaviors at 3 months

Analyses showed up significant differences as reported in table 8.

Preterm infants spent a lower proportion of time involved in Allows Caregiving behavior for what concerns interaction with the mother and a lower proportion of time involved in Orientation to the object not chosen by the mother behavior for what concerns interaction with objects comparing to full-term infants. More differences between the two groups were observed for what concern maternal behaviors.

Mothers of preterms differed from mothers of full-terms in interacting with their infants in that they spent more time involved in Offer of object and Negative Engagement behaviors. Mothers of full-term infants showed more Involvement in the Play of the infant, more Caretaking and more Call for attention behaviors.

6.4.1.2 Relative durations of mother and infant individual and dyadic affective states at 3 months

The analysis of individual affective states revealed no differences between preterm and full-term infants (see Table 9). Significant differences were observed between the mothers of the two groups with mothers of preterm infants spending more time during the interaction with their infants in Negative and Positive affective states and mothers of full-term infants in more Neutral affective states.

At the same time, significant differences emerged for what concerns individual matches. Mother-preterm infant dyads spent more time in sharing negative affecting states (Infant Negative-Mother Negative) while full-term dyads spent more time in sharing neutral affective states (Infant Neutral-Mother Neutral).

For what concerns dyadic mismatching affective states, in mother-premature infant dyads were more present the mismatches Infant Neutral-Mother Positive and in full-term dyads the mismatch Infant Positive-Mother Neutral.

No differences were found between the dyads for what concern the greater overall relative duration of matches and mismatches.

		Preterm dyads (N = 20)		Full-term dyads (N = 20)			
		M	SD	M	SD	X^2 (df)	*p*
Infant codes	*Orientation to Objects Offered by Mother*	.304	.171	.220	.128	2.23(1)	.136
	Orientation to Objects Not Offered by Mother	.229	.167	.345	.147	4.65(1)	.031*
	Orientation to Environment	.183	.131	.213	.145	.68(1)	.410
	Social Monitoring	.116	.094	.072	.059	3.36(1)	.067
	Allows Caregiving	.003	.007	.021	.025	10.86(1)	.001**
	Negative Engagement	.068	.118	.023	.028	6.33(1)	.012*
	Social Positive Engagement	.100	.086	.074	.068	1.21(1)	.271
Mother codes	*Social Positive Engagement*	.285	.178	.215	.149	1.79(1)	.180
	Involvement in the Play	.033	.032	.108	.065	13.12(1)	.000***
	Offer of Object	.310	.180	.142	.080	12.64(1)	.000***
	Caregiving	.055	.044	.074	.053	1.45(1)	.228
	Non-infant Focused	.037	.028	.062	.047	5.03(1)	.025*
	Social Monitoring	.259	.141	.361	.159	4.78(1)	.029*
	Call for Infant's Attention	.016	.017	.027	.025	3.09(1)	.079
	Negative Engagement	.009	.018	.001	.003	4.79(1)	.029*

Table 10 Relative duration of preterm/full-term infants and mothers behaviors at 6 months, differences between the groups.
*p<.05, ** p<.01 *** p<.001

6.4.1.3 Relative duration of mother and infant behaviors at 6 months

Significant differences emerged between the two groups at 6 months, with some findings analogous to the 3 months comparison and other differing (Table 10).

Preterm infants showed more Negative Engagement behaviors and fewer moments in which they Allow Caregiving than they full-term peers. With regard to play with objects, preterm infants showed fewer moments in which they orient their attention to Objects Not Offered by the Mother.

Mothers of preterm infants showed more Negative Engagement behaviors less Social Monitoring, and Not Focalized on infant's activity behaviors than full-term infant mothers.

When playing with objects, mothers of preterm infants spent more time in Offer the object behavior while mothers of full-term infants spent more time in Involvement in the Infant play.

		Preterm dyads (N = 22)		Full-term dyads (N = 20)			
		M	SD	M	SD	X^2 (df)	*p*
Individual affective states	*Infant positive*	.631	.185	.640	.203	.02(1)	.897
	Infant neutral	.301	.157	.338	.187	.61(1)	.436
	Infant negative	.068	.118	.023	.028	6.33(1)	.012*
	Mother positive	.627	.161	.465	.141	9.74(1)	.002**
	Mother neutral	.366	.161	.534	.141	9.95(1)	.002**
	Mother negative	.009	.018	.001	.003	4.79(1)	.029*
	Match	.596	.082	.541	.115	2.98(1)	.085
Dyadic affective states	*Infant positive –Mother positive*	.429	.149	.331	.152	3.32(1)	.068
	Infant neutral – Mother neutral	.142	.129	.209	.117	4.22(1)	.040*
	Infant negative – Mother negative	.004	.009	.000	.001	3.61(1)	.050*
	Infant positive – Mother neutral	.199	.113	.308	.146	6.51(1)	.011*
	Infant positive – Mother negative	.004	.007	.000	.001	4.49(1)	.034*
	Infant neutral – Mother positive	.159	.081	.128	.110	1.27(1)	.259
	Infant neutral – Mother negative	.001	.004	.001	.002	.04(1)	.833
	Infant negative – Mother neutral	.025	.038	.016	.021	.84(1)	.360
	Infant negative – Mother positive	.039	.079	.007	.011	9.75(1)	.002**
	Mismatch	.405	.082	.459	.115	2.94(1)	.086

Table 11 Relative duration of individual and dyadic affective states and total match and mismatch of preterm/full-term dyads at 6 months.

*p<.05, ** p<.01 *** p<.001

6.4.1.4 Relative durations of mother and infant individual and dyadic affective states at 6 months

At 6 months of infant age preterm infants showed more Negative affective state than full-term infants (Table 11).

Similarly to what found at 3 months, mothers of preterms showed in total more Positive and Negative affective states and mothers of full-term showed more Neutral affective states.

The dyadic interaction of preterm infant dyads was more characterized by the Negative match (Infant Negative-Mother Negative) while the dyadic interaction of full-term dyads by the Neutral match (Infant Neutral-Mother Neutral).

Relating to mismatches, when the infant was Positive mothers of full-term infants spent more time in a Neutral state (Infant Positive-Mother Neutral) while mothers of preterms in a Negative state (Infant Positive-Mother Neutral). In preterm dyads was also more present the mismatch Infant Negative-Mother Positive.

Consistent with what reported at 3 months no differences emerged for what concern the overall duration of time spent in total mismatch and match states.

6.4.2 Interaction between time (3/6 months of infant age) and groups (preterm/full-term infant dyads)

6.4.2.1 Relative duration of mother and infant individual behaviors

The estimation model including the interaction factor TIMExGROUP showed significant differences for what concerns infant negative behaviors and maternal caregiving behaviors.

As shown in figure 3a preterm infants Negative Engagement behaviors decreased less over time than full-term infants ones (b = -.951; $X^2_{(1)}$ = 4.04; p = .044). Figure 3b shows that maternal Caregiving behaviors show a similar trend. Full-term infant mothers show a more significant decrease in their caregiving behaviors (b = -.623; $X^2_{(1)}$ = 4.33; p = .037).

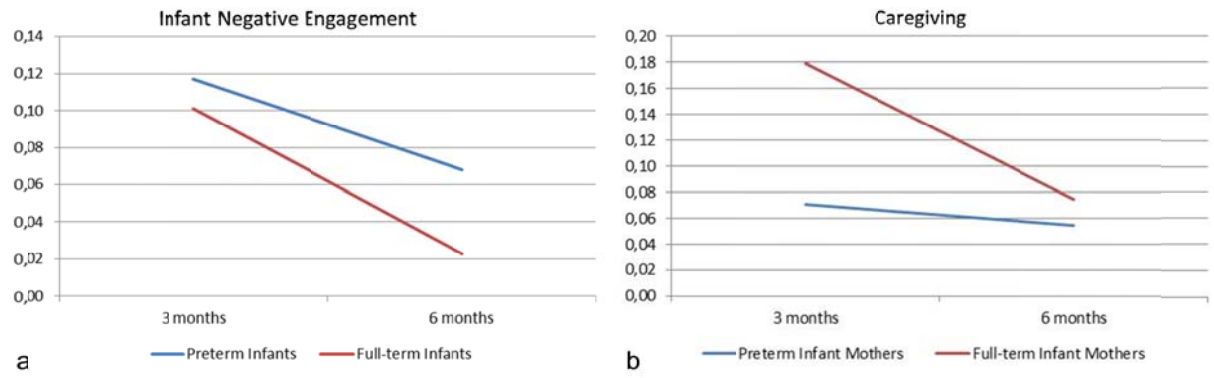

Figure 3 a) Infant Negative Engagement behaviors over time b) Mother Caregiving behaviors over time in preterm/full-term infant dyads.

6.4.2.2 Relative duration of mother and infant individual and dyadic affective state

In line with the individual behavior results, the total relative duration of Infant Negative affective states decreased less for premature infants than for full-term infants (b = -.968; $X^2_{(1)}$ = 4.07; p = .044). Maternal individual affective states were stable over time and over groups. The mismatch Infant Negative-Mother Positive, as shown in figure 4, decreased less in premature infant dyads than in full-term infant dyads (b = -1.228; $X^2_{(1)}$ = 4.79; p = .029).

No significant effects of the interaction were found for what concerns the coordinated affective states and the total matches and mismatches.

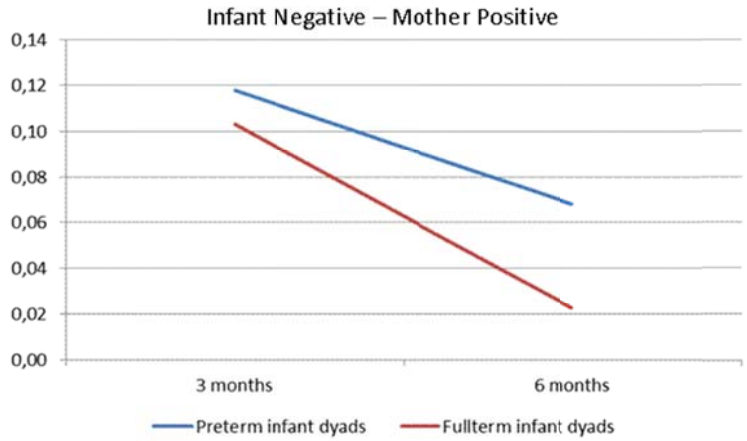

Figure 4 Infant Negative-Mother Positive mismatch over time in preterm/full-term infant dyads.

6.4.3 Interactions between groups (preterm/full-term infant dyads) and maternal attachment classification (secure/insecure)

The Adult Attachment Interviews of all the mothers were coded and assigned to the secure or insecure classification. In the preterm infant mothers group 15 mothers resulted secure and 7 insecure. In the full-term infant mothers group 14 mothers resulted secure and 8 insecure.

The interaction between maternal attachment classifications evaluated with the Adult Attachment Interview and infant state of birth was calculated to see if maternal attachment could be considered a protective factor between prematurity and the quality of the interaction at 3 and 6 months.

None of the models were significant hence statistics are not reported.

6.4.4 Regressions on mother-preterm infant affective states

In order to explore the influences of maternal and infant variables on the individual affective states, a regression model was run with the following predictors: infant gestational age, infant days of hospitalization, infant neonatal risk index, maternal age, previous maternal experience of abortion, and Family SES risk.

Due to the limited number of the preterm infant dyads sub-sample and according to the hypothesis, analyses were conducted only on individual affective states.

At 3 months preterm infants with more days of hospitalization (b = .015; $X^2_{(1)}$ = 16.40; p < .001), born closer to term (b = .019; $X^2_{(1)}$ = 9.38; p = .002) and from family with more risk (b = .314; $X^2_{(1)}$ = 8.18; p = .004) showed more total Infant Positive affective states ($X^2_{(7)}$ = 17.81; p = .013).

The model was significant also for Mother Negative total duration of affective states at 3 months ($X^2_{(7)}$ = 19.06; p = .008). Preterm infant mothers who experienced previous abortions (b = 2.255; $X^2_{(1)}$ = 6.34; p = .012), older (b = .238; $X^2_{(1)}$ = 9.76; p = .002), and with more familiar risk (b = 1.380; $X^2_{(1)}$ = 5.70; p = .017) showed more negative affective states during interaction with their infants.

The models for the other individual affective states were not significant.

None of the models to predict 6 months individual affective states were significant.

6.5 Discussion

The present study supports the general conclusions of previous studies that found interactional differences during early infancy between mother-premature and mother-full-term infant dyads. In addition, our results demonstrate that many of these interactional differences are stable over the first 6 months of infant life. Specifically, mother-premature infant dyads have a typical interactional style that is similar between all of them with only few differences within the group.

Moreover this study put in evidence a peculiar factor: individually those differences are more evident between the mothers than between the infants. This confirms the transactional hypothesis that even in very early infancy interactional characteristics of mother-premature infant dyads are not only the result of preterm infant characteristics but the role of the mother is crucial (Sameroff, 2009).

In line with other major findings of previous researches, this study found mothers of premature infants to be more active and stimulating with their infants during free-play early interactions (Crnic et al., 1983; Schmucker et al., 2005).

With regard to play with objects, very interesting results emerged. Particularly at both ages, preterm infant mothers propose the infant to play with objects more and in some way it seems they tend to lead the interaction. This is also confirmed by the lower disposition to follow their infants' autonomous play compared with full-term infant mothers. Preterm infants, at the same time, show less interest than their born at term peers in exploring objects autonomously in line with what found by other studies (Lester et al., 1985). What is furthermore interesting is that even if preterm infants receive more stimulus from the mother to direct their attention on objects, the time spent in observing the object offered by the mother doesn't different from full-term infants. We can speculate that preterm infants are in general more passive interactive partners and that maternal overstimulating behaviors have the efficacious function to compensate this characteristic with the aim to guarantee an active interaction, consistent with what hypothesized by other authors (Holditch-Davis, Cox et al., 2003).

At 6 months according to Trevarthen (2001), the infant begins to enter in the secondary intersubjectivity phase and, from a prevalently face-to-face interaction with the mother, the infant starts to be aware of objects and he/she starts to explore them. At this age there is not yet a triangulation mother-infant-objects because the infant is not able to share his/her

attention between two focuses. The role of the mother is to stimulate infant autonomous exploration, decreasing in her stimulating activity, and to have the role of scaffolding, matching this exploration with comments and descriptions. In premature infant dyads the time spent by mothers in proposing objects to the infant, at 6 months of infant age, is still greater than what happens in full-term infant dyads and the disposition to follow infant attention is still lower. It seems that these mothers don't adapt their interactions to the increasing competences of their infants and tend to maintain the control of the interaction not favoring autonomous exploration (Fogel & Garvey, 2007). At the same time mothers of preterm infant don't reduce their caregiving behaviors in some way not recognizing infant's growth.

In turn preterm infants seem to live this 6 months transition with more difficulties showing more negative affective behaviors and therefore a greater difficulty in regulating negative emotions than their born at term peers as revealed in other studies (Hsu & Jeng, 2008; Montirosso, Borgatti, Trojan, Zanini, & Tronick, 2010). This difference was not present at 3 months of age (Crnic et al., 1983; Schmucker et al., 2005). The slower decrease of infant negative behaviors over time is consistent with Singer and colleagues (2003) who found that the lower responsiveness that characterizes preterm infant increased, during the first year of life, at a slower rate than in full-terms.

What is furthermore interesting is that no differences were found with regard to infant positive and neutral affectivity neither at 3 nor at 6 months of infant's age. In our sample preterm infants are not in general more neutral or less positive than full-term infants in contrast with what reported in studies who described preterms as less facially responsive more sober and withdrawal (Korja et al., 2010; Muller-Nix et al., 2004) and less vocalizing and playing (Crawford, 1982). Our results are on the contrary consistent with other studies who failed to find differences between preterm and full-term infant for what concern positive affections and passivity (Forcada-Guex, Pierrehumbert, Borghini, Moessinger, & Muller-Nix, 2006; Korja, Latva, & Lehtonen, 2012).

These results let us hypothesize that preterm infants are not in general more difficult interactive partners per se as suggested by previous authors (Crnic et al., 1983). From the in-group analysis we found that infants born closer to term or infants who experienced longer hospitalizations show more positive behaviors consistent with previous studies (Cho et al., 2004; Clark et al., 2008; Poehlmann, Schwichtenberg, Bolt et al., 2011). This confirms the

role of infant immaturity in predicting infant affectivity. Infants who had the possibility to stay more in the NICU regardless their immaturity probably arrive at the moment of discharge more advanced in their development and are more able to regulate their emotions and express positive affects. At the same time the level of risk showed a surprising effect, with infants coming from more at-risk families showing more positive behaviors. This is opposite to what found in previous researches, even if different SES risk indicators were used, and requires more examinations (Dilworth-Bart et al., 2010; Poehlmann, Schwichtenberg, Bolt et al., 2011).

Many more differences were found between preterm and full-term infant mothers affective states at both ages. This confirms furthermore the transactional hypothesis and the fact that prematurity seems to affect the mother interactive style and her approach to the infant even more than what the infant himself/herself does.

Interestingly mothers of preterms show both more positive and negative total affective states than mothers of full-term infants. With regards to the first no differences were found between the groups for the relative duration of positive engagement behaviors whereas the difference is present for the total duration of the positive affective state. We can suppose that the total duration of positive affect is prevalently composed by play with object behaviors rather than positive engagement. In this way the positive affect of premature mothers could be interpreted more as a overstimulating than more positive affective interactive style (Holditch-Davis et al., 2007).

This greater stimulation may also result in more negative behaviors. Qualitatively most of these negative engagement behaviors were characterized by intrusive behaviors. And very interestingly having experienced other traumatic events as previous abortions as well as more familiar risks increased the level of negativity of preterm infant mothers (Schwichtenberg & Poehlmann, 2009).

We can suppose that preterm infant mothers found more difficult interacting with infants and reacted with negative intrusive behaviors not respecting the space of the infant and his/her preferences. At 6 months of infant age this difficulty is also confirmed by the more moments in which the mothers respond negatively to infant positive behaviors (infant positive-mother negative mismatch).

This premature infant mothers' interactive characteristics are similar to what revealed on mothers with a psychiatric illness dyadic interactions with their infants (Weinberg & Tronick, 1998). These mothers were more likely to perceive the interaction negatively and showed more often invasive and disruptive behaviors and more anger to their infants.

At a dyadic level at both ages difficulties in regulating negative emotions is revealed by the greater time spent in sharing negative emotions. Preterm mothers seem less able to transform the negative emotions of their infant, remaining in a negative affective state when the infant is distressed.

With regard to these results, it is interesting to note how the characteristics of preterm infant dyads have some points in common with the depressed mother dyads studied by Tronick and colleagues (2009) and by Field and colleagues (1990) and with insecure mothers studied by Riva Crugnola and colleagues (2009). These authors revealed a predominance of negative emotions in the infants and mothers at an individual level and a greater proportion of dyadic coordinated negative behavior states compared to the control group. The predominance of maternal negative behaviors is also an established risk factor for the development of disorganized attachment patterns (Lyons-Ruth, Bronfman, & Parsons, 1999).

The hypothesis that preterm dyads would be characterized by more passive interactions is furthermore not proved observing neutral behaviors. Mothers of preterm infants showed less neutral affective states than mothers of full-terms and these dyads spent less time in sharing neutral affective moments.

Interestingly at 3 months preterm infant mothers showed more positive behaviors when the infant in neutral compared to full-term infant mothers, in some way trying to reestablish the positive and active characteristic of the interaction. Full-term mothers on the contrary are more able to show neutral behaviors when the infant is positive. This could be interpreted as a greater ability of full-term infant mothers to observe infant play and to let him/her defining the rhythm of the interaction.

Another difference relates when preterm infants express negative emotions and the mothers positive emotions, a type of mismatch more present in preterm infant dyads than in full-term infant dyads and that decreases more over time in the latters. This mismatch was also found by Lyons-Ruth and colleagues (1999) in mothers of disorganized infants' interaction. The authors explained it by the inability of these mothers to understand the infants' emotional signals

combined with an incoherent emotional communication with their infants. This difficulty in reading infant's signals would be consistent with previous findings on preterm infant's mothers (Maguire, Bruil, Wit, & Walther, 2007).

Interestingly no differences were found for what concern the total relative duration of coordinated and not-coordinated affective states between the two groups. Preterm infant dyads in this sample could not be classified more or less coordinated in their affections than full-term infant dyads. The differences visible at a micro level are not visible when we consider a more global measure. This leads to hypothesize that the inconsistency of previous findings could also be due to the measure utilized, as suggested by Korja and colleagues (2012) but further examinations are needed.

In this study maternal attachment models didn't interact with infant birth condition in influencing individual and dyadic affective states and didn't influence premature infant dyads emotion regulation. It seems that under the stressful condition of prematurity the protective effect of maternal security of attachment doesn't work. Cox Hopkins and Hans (2000) found that the representation of maternal attachment with the infant but not maternal history of maternal rejection significantly predicted infant attachment security in preterm infants. Coppola and colleagues (2007) found a mediating role of traumatization between the effect of mother of premature infant attachment on maternal sensitivity.

In conclusion these findings delineate a different interactive style of preterm infant dyads compared with full-term infant dyads. The micro-analysis of interactions revealed that the differences are more present with regard to maternal interactive style. These findings confirm the hypothesis of a more stimulating interactive style of preterm mothers to compensate the lower interactional abilities of their infants. It seems that this interactional style is appropriate very early in infancy in increasing infant responses but later at 6 months more interactional dyadic risk indicators emerge. This lead to suppose that preterm infant mothers are less able to adjust over time to infant changes in interacting competences and interests (Fogel & Garvey, 2007). This may have implications for the formation of the first cores of the self and may affect the formation of infant relational and attachment models (Lyons-Ruth et al., 1999; Tronick, 2005; Tronick, 1989).

Interpreting this result keeping into consideration mothers of preterm infants' difficulties in understanding their infants due to the difficult beginning of their interactive story, would help in comprehending this phenomenon and in planning more suitable intervention programs.

More studies with more time points measures over time are needed to explore the development of mother-premature infant interactions and to replicate these findings. Also the analysis of infant outcomes as attachment would give much information about the effect of the quality of premature infant-mother interaction on infant socio-emotional development.

CHAPTER 7
STUDY 3
FROM PREMATURITY TO PARENTING STRESS: THE MEDIATING ROLE OF POST-TRAUMATIC STRESS DISORDER

7.1 Mothers' Post-Traumatic reactions following preterm birth

It has long been recognized that some women following a difficult childbirth go on to develop psychological problems. However, it is only recently that it has become accepted that women can develop post-traumatic stress disorder (PTSD) as a response to difficult childbirth (Bailham & Joseph, 2003). Following on from reports of women who experienced difficult childbirth, there is now evidence of women presenting with clinical symptoms consistent with DSM-IV criteria of avoidance, re-experiencing and increased arousal, with implications for maternal wellbeing, relationships with significant others, and disruption in early mother-infant relationships (Ayers, Eagle, & Waring, 2006).

Recent studies have corroborated the traumatic effects of premature birth on parents, revealing the presence of considerable levels of stress that may result in the listed PTSD symptoms (Holditch-Davis et al., 2009).

Vanderbilt and colleagues (2009) reported that the 24% of mothers with preterm infants in the NICU met screening criteria for risk of a diagnosis of acute post-traumatic stress disorder within the first week after birth compared with 3% of the mothers with infants born full-term. Similar findings have been documented in other studies on maternal PTSD following premature delivery (Muller-Nix et al., 2004; Pierrehumbert et al., 2003; Rowe & Jones, 2010). These symptoms did not seem to reduce even 14 months after birth (Kersting et al., 2004).

Interviewing mothers of premature infants 6 months after childbirth, Holditch-Davis and colleagues (2003) accounted that all of them appeared to experience at least one emotional response similar to a post-traumatic stress reaction. Symptoms as re-experiencing the premature birth of their child through intrusive thoughts elicited by reminders and talking about their experience as though it were currently happening were reported by the 80% mothers. Symptoms of avoidance like trying to forget the experience, avoiding thinking about the experience, numbing to reminders, or denying potential problems in the baby were present

as well in the 80% of the interviews. Arousal symptoms were the more frequent with the 87% of mothers reporting overprotection of the child, persistent fears that the child might die or become sick again, sleep difficulties, and generalized anxiety.

In particular, the fear of losing their babies has been found to be an important contributory factor to the development of PTSD in mothers of premature infants. Affleck and colleagues (1991) conducted a longitudinal study with mothers who gave birth to premature infants. At 6 and 18 months after infant birth, many of the women spoke of painful memories of the childbirth and the infant's hospitalization. Women described themselves as living in constant fear that their babies could die and many of them reported symptoms of intrusions and avoidance.

DeMier and colleagues (2000) additionally reported that, for mothers of preterm infants, higher levels of PTSD symptoms in the 6 months after birth were significantly related to both infant immaturity and the severity of postnatal complications as confirmed by other researchers (Pierrehumbert et al., 2003).

It is then possible that PTSD symptoms could have a detrimental effect on the early relationship between the mother and her baby (Essex, Klein, Cho, & Kalin, 2002). If not resolved, these symptoms may become chronic and affect the quality of early mother-child dyadic interactions and attachment (Coppola et al., 2007; Pierrehumbert et al., 2003; Shah et al., 2011). Shah and colleagues (2011) showed how the inability of the mother to resolve the grief associated with the experience of preterm birth influence the quality of mother-infant attachment.

These findings highlight the importance of the prevention of psychological distress in preterm mothers as opposed to treatment and cure when distress is evident (Jotzo & Poets, 2005).

7.2 Parenting stress in mothers of preterm infants

Parenting stress is a well-established construct identified as the perceived discrepancy between the demands of parenting and the resources available to meet those demands (Abidin, 1995). The current literature suggests that experiencing particularly stressful situations or conditions may lead to an increase in this discrepancy and, consequently, to higher levels of parenting stress.

Researchers have found that the ways in which parents cope with these stressful situations are associated with child development and parent-child relationship outcomes, supporting the transactional model of development (Sameroff, 2009). For example, high levels of parenting stress have been linked to less child competences (Cappa, Begle, Conger, Dumas, & Conger, 2011; Sparks, Hunter, Backman, Morgan, & Ross, 2012), more early childhood anxiety symptoms (Pahl, Barrett, & Gullo, 2012), behavioral problems (Benzies, Harrison, & Magill Evans, 2004), and maternal perceptions of child difficulty (Mäntymaa, Puura, Luoma, Salmelin, & Tamminen, 2006). At the same time, parenting stress has also been seen as a factor influencing parenting behavior and as a determinant of dysfunctional parenting (Webster-Stratton, 1990).

Several studies have analyzed the level of parenting stress by comparing parents of preterm and full-term children. Results have been mixed, with some studies finding higher levels of parenting stress in mothers of preterm children compared to mothers of full-term children, and others failing to find such differences (Brummelte et al., 2011; Candelaria, O'Connell, & Teti, 2006; Gray, Edwards, O'Callaghan, & Cuskelly, 2012; Halpern, Brand, & Malone, 2001; Singer et al., 1999; Treyvaud et al., 2011).

The severity of prematurity and neonatal complications (e.g., duration of ventilation, respiratory distress and cerebral hemorrhages) can influence the long-term development of the child and the anxiety, caused by the threatened loss of the infant may permanently change the way a parent perceives and interacts with the infant. The sicker the infant, the higher level of parenting stress is reported by mothers after hospital discharge (Allen et al., 2004; Holditch-Davis et al., 2009) and mothers of low-birth-weight infants experience a slower rate of parenting stress decrease over time than mothers of healthy term infants (Singer et al., 2010).

Also parenting multiples could be a more stressful experience due to the growing demands of having more than one child. Previous studies have found that mothers of twins showed significantly higher levels of parenting stress and depression than mothers of singletons and they were significantly more likely to find parenting difficult and significantly less likely to obtain pleasure from their children (Glazebrook, Sheard, Cox, Oates, & Ndukwe, 2004; Olivennes, Golombok, Ramogida, & Rust, 2005).

The mother-infant relationship is also affected by individual characteristics as well as the ecological and psychosocial context. In a sample of African American mothers of preterm

infants, Candelaria and colleagues (2006) found that cumulative psychosocial risk, including low maternal education and social support and parental attitudes, but not infant medical risk, predicted parenting stress in the early post-partum period. In another study premature infant mothers who reported higher stress related to the NICU experience and more depression, anxiety and PTSD symptoms were also the mothers with the lowest education level (Holditch-Davis et al., 2009).

There is growing evidence that social support and family resources play an important role in the ability of parents to deal with the overwhelming experience of the NICU and of the first interaction with the child, reducing the level of stress experienced by mothers (Pinelli, 2000). Singer and colleagues (1996) reported that lower general social support predicted high distress levels, but only for mothers of very low-birth weight infants.

7.3 Introduction to Study 3

Starting during pregnancy, parents face multiple stressors related to their child's development, and parents differ in their responses to these situations (Abidin, 1990). Whereas some parents are able to cope with the challenges in an effective manner, other parents experience difficulty coping, including reactions that reflect displays of emotional intensity, inappropriate reactivity, or emotional withdrawal.

The literature review reported above and in the previous chapters, illustrates that parenting a premature infant may be considered a very stressful and demanding experience. However, as shown above, several studies found that mothers of premature infants report higher levels of parenting stress than mothers of full-terms, but others failed to find these differences. The discrepancy of these findings led to establish that prematurity *per se* cannot fully account for the stress experienced by mothers in the relationship with their children. Some prematures' mothers experience parenting their infant as very stressful but others don't.

Moreover preterm birth can be considered a potentially traumatic event that can influence maternal representations and wellbeing (Miles & Holditch-Davis, 1997). As reported above recent studies have corroborated this hypothesis revealing the presence of considerable levels of stress that may result in Post-Traumatic Stress Disorder's symptoms in preterm infant mothers.

According to the transactional model of development, child and parent characteristics and interactions develop over time as a result of mutual influences between the child and parent (Sameroff, 2009). Parenting stress can thereby be considered as a complex phenomenon that is the result of the complex interplay among the parent, the child and the situation (Abidin, 1990) and the study of parenting stress in mothers of premature infants needs to take into consideration variables that may play an important role in influencing its development.

From a transactional point of view we could expect that when parents experience preterm delivery as a traumatic event this would in turn affect their parenting behaviors and their experience of parenting. These parents would perceive more discrepancy between the demands of parenting and the personal resources available to meet those demands (Abidin, 1992). And these would in turn lead to higher levels of stress perceived in parenting the infant.

The present study has the aim to asses this hypothesis.

7.4 Study goals and hypothesis

The principal aim of our study was to examine the role of PTSD symptoms related to childbirth in the development of parenting stress in a sample of mothers of preterm and full-term children. We hypothesized that the level of perinatal PTSD symptoms reported by mothers may mediate the relation between preterm delivery and the development of parenting stress as represented in figure 5.

Given these issues, higher levels of PTSD symptoms and parenting stress are expected in mothers of preterm children as opposed to mothers of full-term children, with preterm children mothers who experienced childbirth as a more traumatic event, showing higher levels of parenting stress and mothers who were able to re-elaborate the grief associated with infant's preterm birth, showing less parenting stress.

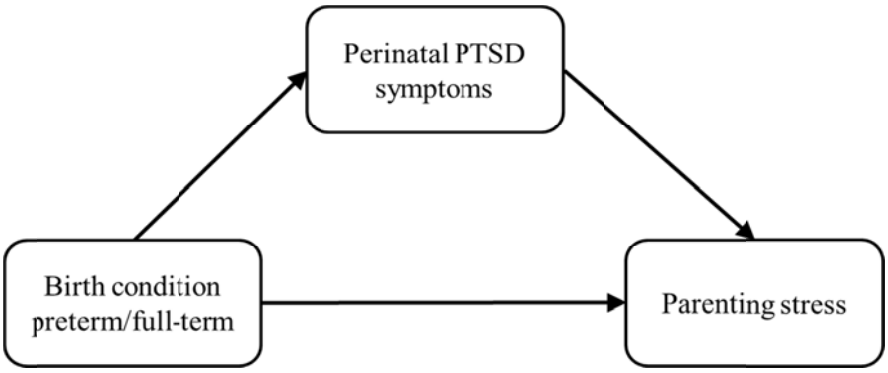

Figure 5 Moderation model.

Furthermore the many studies cited in the previous chapters underline the importance of considering different levels of prematurity, maternal individual characteristics as well as the ecological and psychosocial context in the study of parenting preterm infants (Allen et al., 2004; DeMier et al., 2000; Holditch-Davis et al., 2009; Singer et al., 2010). To examine the role of these factors on the development of perinatal PTSD we conducted a further analysis taking into account only the preterm children mothers group. We explored how any maternal or infant variables affect the levels of perinatal PTSD.

We expected that mothers of more at-risk preterm infants and mothers with a lower socio-economic condition would show more perinatal PTSD symptoms.

7.5 Method

7.5.1 Data collection

To examine our hypothesis we conducted a Web-survey. Participants were recruited through online forums related to pregnancy, childrearing and prematurity. A virtual message was placed on each forum board. In the message, mothers of children aged 1 month to 3 years were invited to anonymously participate in the research by completing an online survey. Because the survey included questions about the child and the parent-child relationship, mothers were asked to refer to their youngest child if they had more than one.

According to Converse Wolfe, Huang and Oswald (2008) Web-based survey techniques represent an important option for evaluators across disciplines. They present several potential benefits as Web-based surveys are much cheaper to conduct, are faster, give access to larger

samples and, they yield higher response rates than conventional survey modes (Fricker & Schonlau, 2002).

Given these advantages the use of Web-based techniques program increased during the last years.

However, there are also several potential limitations to Web-based surveys (Couper, 2000). It is generally agreed that the major sources of error in surveys include sampling, coverage, non-response, and measurement error. Coverage error is presently the biggest threat to inference from Web surveys because the part of the population that doesn't have access at the web is excluded. At the same time we do not know how many people fail to complete Web surveys for technical reasons. As Couper (2000) highlighted several measurement errors in self-administered surveys could arise, for example, from the respondent's lack of motivation, comprehension problems and deliberate distortion. Other limits are addressed in the conclusion of this chapter.

The main reason why we decided to collect data with this technique was to reach a more nationwide and larger sample. This study had the aim to explore the processes emerged and we kept in mind the limits of this kind of data collection.

7.5.2 Participants

Respondents who did not complete the entire questionnaire, mothers of infants less than 1 month old (corrected age for preterm infants) and mothers of infants with severe pathologies or congenital abnormalities at birth, were excluded from the study. The final sample included 243 mothers: 156 mothers of full-term children and 87 mothers of preterm children (gestational age < 37 weeks).

Descriptive statistics concerning socio-demographic and child-related variables for the full-term and preterm groups are reported in Table 12. Groups don't differ for any of the socio-demographic variables, such as maternal age and education, and children's age.

As shown in Table 12, the children in the preterm group were characterized by heterogeneous conditions of immaturity at birth, ranging from low- to high-risk conditions. The mean gestational age was 30.4 weeks, ranging from 23.7 to 36.8 weeks, and the mean birth weight was 1377 grams, with a range of 360-3170 grams. The length of hospitalization also varied significantly in the sample, ranging from 5 to 230 days. Children in the preterm

group suffered the following postnatal complications: 61% jaundice, 39% apnea/bradycardia, 44% respiratory distress syndrome, and 11% intraventricular hemorrhage. This sample reflects the typical heterogeneity of the population of preterm children.

	Preterm Group (N = 87)	Full-term Group (N = 156)	
	Mean (SD)	Mean (SD)	*t* (*p* value)
Mother age (years)	34.2 (3.9)	34.4 (4.7)	0.31 (.766)
Mother education (years)	15.8 (3.5)	16.6 (3.4)	1.72 (.091)
Child age[a] (months)	17.7 (10.8)	16.4 (9.8)	-9.74 (.331)
Mother living with the partner (%)	97.7%	100%	
Infant gender (%)	F = 50.6%	F = 48.7%	
Multiples (%)	11.5%	0.6%	
Firstborn child (%)	78.2%	59%	
Preterm infants:			
Birth-weight (grams)	1377 (669)		
Gestational age (weeks)	30.4 (3.6)		
Hospitalization (days)	61.8 (48.3)		

Table 12 Demographic characteristics of the participants ; Descriptive statistics and t-test results

[a] corrected age for preterm children

7.5.3 Measures

Perinatal PTSD Questionnaire (PPQ) - modified version (Callahan, Borja, & Hynan, 2006). The modified Perinatal PTSD Questionnaire (PPQ) is a 14-item questionnaire assessing post-traumatic symptoms related to the childbirth experience, including intrusiveness or re-experiencing, avoidance behaviors, hyper-arousal and general post-traumatic symptoms (see Appendix C). Mothers were asked to indicate on a five-point Likert scale (0 = not at all to 4 = often, for more than a month) how often they experienced symptoms after childbirth. The total possible score ranged from 0 to 56. Based on the validation by Callahan and colleagues (2006), the clinical range for high-risk mothers is 19 or higher. The authors also highlighted the presence of three principal components corresponding to the Diagnostic and Statistical Manual (DSM)-IV-TR diagnostic criteria for PTSD: the first component, accounting for a higher percentage of variance, includes symptoms fitting criterion D (disruptions in arousal); the second component fits criterion C (avoidance of stimuli associated with the trauma and

numbing of general responsiveness); and the last component includes symptoms fitting criterion B (intrusiveness). In the current investigation, internal consistency was high, with α = 0.88. Internal consistency was also high for the three above-mentioned components (first component α = 0.76; second component α = 0.75; third component α = 0.77).

Parenting Stress Index - Short Form (PSI-SF) (Abidin, 1987-2006). The PSI-SF is a commonly used measure of stress related to the parenting role, developed by Abidin (1995). The Italian form of the PSI-SF was administered in this study. It includes 36 items that are rated from 1 to 5 on a Likert scale (range of responses, 1 = strongly disagree to 5 = strongly agree). The PSI-SF is reported to have satisfactory internal consistency and test-retest reliability with the full version of the PSI (Abidin, 1995). The PSI-SF consists of three subscales that each includes 12 items: *Parental Distress (PD)*, *Parent-Child Dysfunctional Interaction (P-CDI)* and *Difficult Child (DC)*. The PD scale includes items related to the stress experienced by the participant in his/her parental role, particularly individual factors. The P-CDI scale focuses on the parental belief that the child does not meet the parent's expectations and that the child does not reinforce the parent during their interactions. The DC scale measures whether the parent perceives the child as easy or difficult to manage due to his/her behavioral and/or temperamental characteristics. Finally, the administration of the PSI-SF provides a parenting total stress score (TS) that reflects the sum of the previous subscale scores. High values indicate more parenting stress. In this investigation, the internal consistency of the subscales and the total scale was high (PD: α = 0.89; P-CDI: α = 0.82; DC: α = 0.85; TS: α = 0.91).

Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS scale (see Appendix B) is a 12-item self-report questionnaire that investigates the social support a person experiences from family, friends and significant others. Participants express their agreement with the statements on a 7-point Likert scale (1 = very strongly disagree to 7 = very strongly agree). The Italian validation of the scale was used in this study (Di Fabio & Busoni, 2008). The MSPSS provides a global score of perceived social support: high values indicate high levels of perceived social support. In this investigation, the internal consistency of the MSPSS was very high (α = 0.94).

Family SES index. The Hollingshead's four factor index of social status was calculated (Hollingshead, 1975). The measure is based on the education and occupation of each employed parent living at home. Occupations are rated on a 9-point scale and education is rated on a 7-point scale based on the number of years of schooling. To calculate the index for a family, the occupation and education scores are weighted and summed. For dual-income families, the index is calculated by averaging the scores for each earner.

Neonatal health risks (for preterm infants). Medical information was collected for preterm children and a neonatal health risk index was calculated. This index is the sum of the presence of neonatal medical risks, each dichotomized into 1 if present, 0 if absent: diagnosis of apnea, respiratory distress, chronic lung disease, gastro esophageal reflux, 5-min Apgar score less than 6. Because infant birth weight and gestational age were highly correlated (r =.851, p < .001), we selected gestational age as an infant index of prematurity. We also included as a neonatal health risk factor predictors if the infant was a multiple (0 = No; 1 = Yes) and the total number of days the infant was hospitalized.

7.6 Results

7.6.1 Group Differences

Independent samples t-test analyses were conducted to compare mothers of full-term children and mothers of preterm children with respect to the variables examined. The results are reported in Table 13.

	Mothers of Preterm children (N = 87)		Mothers of Full-term children (N = 156)				
	Mean	SD	Mean	SD	*t*	df	*p*
PTSD total score	22.11	12.75	10.45	8.82	-7.58	132	.000***
PTSD intrusiveness	4.94	3.88	1.37	2.09	-7.98	114	.000***
PTSD avoidance	7.40	5.83	3.63	3.85	-5.42	128	.000***
PTSD hyperarousal	9.77	5.05	5.46	4.52	-6.63	162	.000***
PSI TS	73.56	23.15	66.78	16.12	-2.43	133	.017*
PSI PD	30.53	12.03	27.28	9.11	-2.19	141	.030*
PSI P-CDI	19.59	7.09	17.00	4.46	-3.07	124	.003**
PSI DC	23.45	8.62	22.49	6.89	-0.89	147	.376
MSPSS	68.10	15.35	69.54	13.73	0.73	161	.467

Table 13 Study variables; Descriptive statistics and t-test results.

Regarding the PPQ questionnaire, mothers of preterm children reported more PTSD symptoms than mothers in the control group. These differences were statistically significant for all of the subscale scores as well as for the total PPQ score. When using the clinical cut-off for the PPQ, 16% of the mothers of full-term children and 55% of the mothers of preterm children had perinatal PTSD. Concerning parenting stress, the results showed significant differences between the two groups on the PSI Total Score scale (PSI TS), the PSI Parental Distress subscale (PSI PD) and the Parent-Child Dysfunctional Interaction subscale (PSI P-CDI). Specifically, mothers of preterm children reported higher levels of parenting stress. No differences were found in the PSI Difficult Child subscale. Finally, the t-test conducted on the Multidimensional Scale of Perceived Social Support (MSPSS) revealed no differences between mothers of full-term and preterm children.

The analysis of correlation between variable showed that preterm delivery, total PTSD symptoms, and the PSI total score were positively associated (see Table 14). A high level of perceived social support was positively related with low scores on the PTSD and PSI scales. Furthermore, the results indicated that mothers of older children experienced more parenting stress than mothers of younger children.

	1.	2.	3.	4.	5.
1. Preterm Delivery	-				
2. PTSD TOT	.475**	-			
3. MSPSS	-.048	-.392**	-		
4. PSI TS	.170**	.456**	-.370**	-	
5. child age	.063	.009	.061	.127*	-

Table 14 Study **v**ariables **i**ntercorrelations**.**
* p < .05 ; ** p < .01 ; *** p < .001.

7.6.2 Assessing a mediation hypothesis: From prematurity to parenting stress through perinatal PTSD

To investigate our mediator hypothesis (see figure 5 and 6) we used a bootstrap approach to mediation, developed by Preacher and Hayes (2004). The INDIRECT macro for SPSS was used to conduct the mediation analysis. Because of its significant associations with PTSD and PSI, perceived social support was also entered in the analysis as a covariate. The results of the mediation analysis are reported in Table 15.

	B Coefficient	SE	T	p
c	5.718	2.345	2.438	.015*
a	11.223	1.272	8.823	.000***
b	0.615	0.113	5.459	.000***
c'	-1.183	2.551	-0.464	.643
			BC 95% CI LL	BC 95% CI UL
axb	6.901	1.613	4.199	10.682

a R^2adj = .295 F = 22.14 (4.238)

Table 15 Regression results for simple Mediation.
* p < .05 ; ** p < .01 ; *** p < .001.

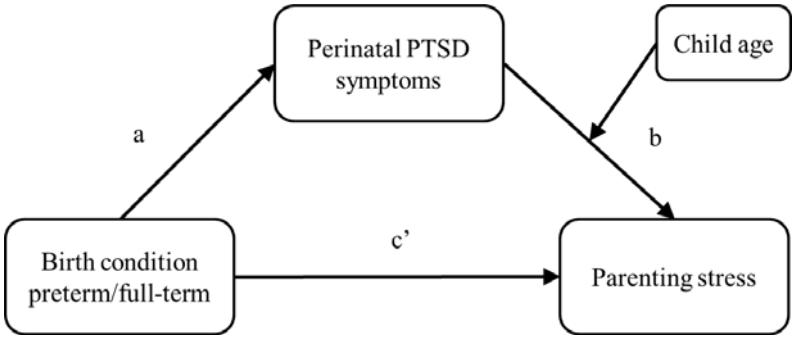

Figure 6 Moderation-Mediation Model

The results indicated that the direct effect of preterm/full-term childbirth on the total PSI (c' path) was not statistically significant. On the contrary, as indicated by the significant unstandardized coefficients reported in Table 16, the indirect effect of preterm/full-term birth on parenting stress (path c) as well as the associations between preterm/full-term childbirth and PTSD TOT (path a) and PTSD TOT and parenting stress (path b) were statically significant. Furthermore, bootstrap results provided 95% bias-corrected confidence intervals for the indirect effect not containing zero (4.199, 10.682).

Given the significant association between child age and maternal levels of parenting stress reported in Table 14, the role of child age was further investigated. This variable was entered into the moderation model as a moderator between perinatal PTSD symptoms and total PSI keeping the same covariate. The mediation-moderation model was tested using the SPSS macro MODMED, developed by Preacher, Rucker and Hayes (2007). The results of this analysis (shown in Table 16) revealed that child's age moderates the relationship between maternal perinatal PTSD and parenting stress. In particular, bootstrap analyses indicated that when PTSD symptoms are mostly absent (values < clinical cut-off), older children (+1SD) cause more parenting stress, whereas for high levels of perinatal PTSD symptoms, parenting younger children (-1SD) is more stressful.

		B Coefficient	*SE*	*t*	*p*		
Mediator Variable Model							
	Preterm/Term Delivery	10.220	1.341	7.623	.000***		
	MSPSS	0.301	0.042	7.084	.000***		
Dependent Variable Model							
	Preterm/Term Delivery	-0.560	2.524	-0.222	.825		
	PTSD TOT	1.030	0.184	5.594	.000***		
	Child Age	0.610	0.160	3.803	.000***		
	PTSD TOT x Child Age	-0.025	0.009	-2.825	.005**		
	MSPSS	0.300	0.081	3.712	.000***		
		B Coefficient	*SE*	*t*	*p*	BC 95% CI LL	BC 95% CI UL
Conditional Indirect Effect at Specific Values of the Moderator							
	-1SD	8.080	1.799	4.491	.000***	5.731	14.372
Child Age	Mean	5.848	1.362	4.295	.000***	4.214	10.479
	+1SD	3.617	1.506	2.402	.016*	0.952	8.334

Table 16 Regression results for Moderated-Mediation.
* p < .05 ; ** p < .01 ; *** p < .001.

7.6.3 The role of infant and maternal factors on the level of perinatal PTSD: a regression model

A regression analysis was conducted on the subsample of mothers of preterm infants. The Family SES index, maternal age, infant gestational age, infant days of hospitalization, if the infant was a multiple and the order of birth were included as maternal and infant factors predictors on the level of maternal perinatal PTSD symptoms. Infant gestational age was grand mean centered.

The analysis revealed (see Table 17) that the only significant predictor of perinatal PTSD symptoms was infant gestational age (β = -.399; $F_{(df)} = 16.11_{(1.85)}$; $p < .001$) that accounted for 15% of the total variance.

	R^2	R^2 adj	F(df)	β
	.159	.149	16.11 (1.85)***	
Gestational Age (days)				-.399***
Days of hospitalization				.067
Multiples				.007
Neonatal health risks				.153
Family SES index				-.049
First born child				-.077

Table 17 Regression Results for perinatal PTSD in the preterm infant mothers group.
* p < .05 ; ** p < .01 ; *** p < .001.

7.7 Discussion

The hypothesis guiding this study was that prematurity *per se* cannot be considered a risk factor for the development of parenting stress. Considering preterm delivery a potentially traumatic experience, we hypothesized that - as typically occurs with any traumatic event - the ability to re-elaborate the experience itself in an adaptive way, represented by lower levels of perinatal PTSD symptoms, may prevent its negative effects on mother-infant relationship as represented by higher levels of parenting stress (Jotzo & Poets, 2005; Kaaresen, Ronning, Ulvund, & Dahl, 2006).

Our results highlighted the presence of higher levels of parenting stress in mothers of preterm children compared to mothers of full-term children, corroborating the results of other investigations on this topic (Brummelte et al., 2011; Gray et al., 2012; Singer et al., 1999).

However, it is noteworthy that these differences were significant for all aspects of parenting stress related to the interaction with the infant but not for the PSI Difficult Child subscale. This result confirms previous findings establishing that prematurity affects prevalently the mother-infant dyadic relationship and, in line with other authors who draw a more complex picture of preterm children's interactive patterns, suggest that premature children are not in general perceived as more difficult to manage than their full-term peers (Forcada-Guex et al., 2006; Korja, Maunu et al., 2008).

Supporting the findings from recent studies that associated levels of perinatal PTSD with prematurity (Callahan et al., 2006; Muller-Nix et al., 2004; Pierrehumbert et al., 2003) these results showed that the mothers of the preterm group reported higher symptoms of post-traumatic stress associated with childbirth. In particular, more than half of the mothers of preterm children and 16% of mothers in the full-term group exhibited post-traumatic reactions in the clinical range according to Callahan and colleagues criteria (2006). Although the former result is unsurprising and it is in line with previous studies, the latter is slightly higher than the percentages described in the literature (Ayers & Pickering, 2001; Muller-Nix et al., 2004; Söderquist, Wijma, Thorbert, & Wijma, 2009). We assume that this higher percentage of post-traumatic reactions in mothers of full-term children may be due to the method of data collection. Web-surveys may allow mothers to complete the questionnaires in a more private environment in comparison to paper-and-pencil questionnaires, which in this kind of studies are usually administered in the hospital wards and, as other studies have indicated, this may increase respondents' willingness to report sensitive information (Wang et al., 2005).

Very interesting results emerged from the moderation-mediation model. As previously hypothesized, taking into account the mediator role of the mother's perinatal post-traumatic stress between preterm/full-term childbirth and the level of parenting stress, the direct effect of childbirth on parenting stress was not significant anymore. This demonstrated that - although preterm delivery enhances the possibility to report PTSD symptoms - the preterm delivery doesn't fully and by itself explain later levels of parenting stress experienced by these mothers. Mothers who experienced infant birth as a traumatic event reported higher levels of parenting stress but mothers who were able to re-elaborate such experience showed lower level of stress. Other studies have suggested a similar role of perinatal PTSD in mediating

prematurity and later mother-infant relational quality (Muller-Nix et al., 2004; Shah et al., 2011) and developmental issues (Pierrehumbert et al., 2003).

Interestingly, when we entered the child's age into our mediation analysis as a moderator between perinatal PTSD and parenting stress, our results showed that for low levels of PTSD symptoms, parenting older children was experienced as more stressful. Whereas mothers who reported more severe perinatal PTSD symptoms perceived parenting younger children as more stressful.

In the absence of perinatal PTSD, the positive relationship between child age and parenting stress is consistent with previous findings with parenting older children perceived as more stressful (Kaaresen et al., 2006; Singer et al., 1999). We speculate that mothers who experienced the childbirth as a traumatic event have more difficulty managing infants, who typically demand more time and effort than older children.

The analysis conducted in the preterm infant mothers group revealed that mothers with younger for gestational age children reported more PTSD symptoms. Experiencing preterm birth earlier in pregnancy influences more the level of perinatal PTSD. This is in line with DeMier and colleagues (2000) and Pierrehumbert and colleagues (2003) findings, that reported how infant immaturity accounts more than other variables for mothers' traumatic reaction to preterm birth.

Contrary to what expected, any of the maternal variables entered in the model influenced maternal PTSD symptoms. Whereas many studies documented the effect of maternal personality and prior psychological vulnerability factors on PTSD levels (Bailham & Joseph, 2003), an insufficient number of studies have analyzed the role of maternal socio-demographic variables. However, in samples of term mothers both Wijma, Soderquist, and Wijma (1997) and Czarnocka and Slade (2000), comparing mothers with perinatal PTSD with mothers without such a symptoms profile, found similarly no differences with regards maternal age and educational level. Further examinations in preterm infant samples are needed.

In conclusion, this study's findings demonstrate that childbirth-related post-traumatic stress symptoms are more common in mothers of preterm children than in mothers of full-term children. The level of these symptoms, more than being mothers of a preterm infant itself, seems to affect the level of parenting stress experienced by mothers.

Psychological intervention programs for parents of premature infants may help parents to process the childbirth experience and may reduce the extent of parents' symptomatic responses to the traumatic impact of a preterm birth. According to this study's findings we may suppose that these intervention programs would then in turn prevent mother-child relational difficulties as experiencing parenting the infant stressful.

This study presents some limitations that should be addressed in future works. Other factors that may affect parenting stress, such as the behavioral and temperamental characteristics of the child, should be considered. Furthermore, other maternal personality and psychological characteristics may influence the maternal ability to cope with the traumatic effect of a preterm birth.

It would be worthwhile to investigate the associations between childbirth, perinatal PTSD and later parenting stress from a longitudinal perspective to analyze the different individual courses of this traumatic experience.

CHAPTER 8
CONCLUSIONS AND IMPLICATIONS FOR CLINICAL INTERVENTIONS

8.1 Conclusions

Through the application of qualitative and quantitative methodologies and thanks to the different angles used to examine the phenomenon, the studies included in this dissertation led to achieve an interesting contribution to the study of maternal experience of parenting a preterm infant.

The literature review helped to broad the knowledge of prematurity's implications pointing the attention to the necessity to study the phenomenon from a transactional perspective considering its repercussions for mothers and mother-infant relationship

The interviews were useful in eliciting clinically relevant information and were sensitive to personal issues and greater details about mothers' concerns. Thus, the interviews helped to broad the focus of the attention from the infant medical condition alone to the infant-in-context, thereby expanding the traditional medical-technological orientation into the attention of premature birth's effects on mother's transition to parenthood (Meyer et al., 1993). The second study helped to outline the implications of premature birth on mother-premature infant relationship by observing the quality of mother's and infant's behaviors and affective communication during early interactions. The last study enhanced the traumatic impact of the experience of preterm birth and its effect on the stress these mothers experience in parenting a preterm infant adding a further contribution to understand the phenomenon.

The studies confirmed that mother-premature infant relationship is a complex system, which is affected by characteristics of both the mother and the child and develops in a reciprocal, dynamic, bidirectional manner over time as the transactional model of development assumed (see Chapter 4.1) (Poehlmann & Fiese, 2001a; Sameroff, 2009).

Furthermore, these findings underline how the development of maternal relationship with the preterm infant is a process rather than just an instant transformation and point out that the unexpected birth of the infant and his/her hospitalization disturbed maternal transition to parenthood and maternal experience of parenting (Tracey, 2000). Thus, is fundamental to consider the process of parenting preterm infants from a transactional perspective examining it

over time throughout the different critical moments of mother-infant's life (Meyer et al., 1993; Miles et al., 1993; Sameroff, 2009).

The Figure 7 summarizes this process.

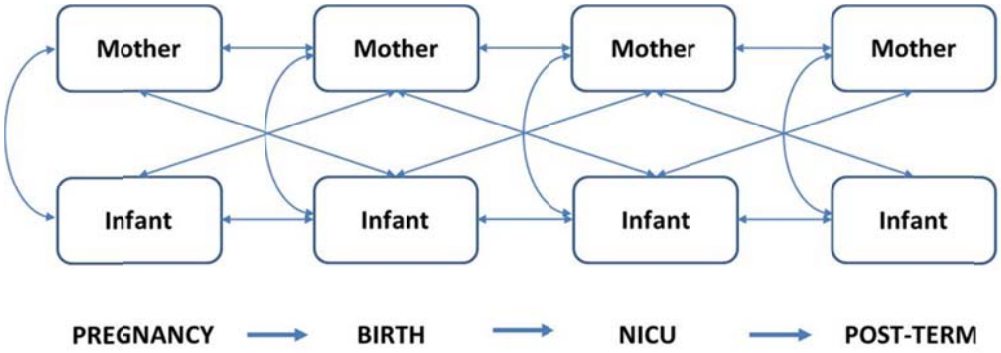

Figure 7 The development of mother-premature infant relationship from a transactional perspective.

The preterm delivery itself represents the first moment of crisis for these mothers.

When interviewed mothers describe the experience as very traumatic and detail its impact on their wellbeing. Study 3 confirmed this finding reporting that women, who experienced delivery before due date show more post-traumatic symptoms and the earlier the delivery occurred during pregnancy the higher was the level of symptoms.

As illustrated in Chapter 2, Daniel Stern (1995) stated that a "motherhood constellation" begins to appear in late pregnancy and persists into the early period of motherhood. He described four interrelated component themes of this new psychic organization, the last of which is "identity reorganization". Stern stated that identity reorganization requires the new mother to transform and reorganize her identity. If a mother is incapable of this reorienting process, the ability to execute the other component themes is compromised (Stern, 1995).

Mothers of preterm infants show several difficulties in accomplishing this process. The delivery represents a hurled separation from the baby, the interruption of their fusion relationship. They observed themselves as mothers before feeling prepared to be (Black et al., 2009). Our findings put in evidence how this abrupt interruption of the typical transition to parenthood requires mothers to reorganize their own representations abandoning the idea of what being a good mother means in favor of the limited parental role these mothers have in their infant's early life (see Chapter 2 and 4). This is furthermore enhanced by the feelings of

failure and guilt for the premature birth, as though mothers were responsible for the outcome of the pregnancy and for having given birth to a high-risk infant (Lupton & Fenwick, 2001).

Immediately after the delivery it is common for parents of a healthy, term infant to be allowed time alone with their newborn and this happens even more during the days and months following the birth. In a normal condition this proximity is essential to promote the survival and to protect the baby and to promote the development of parental bond with the infant (Bowlby, 1990). The birth of a premature infant deprives both parents of these early contact experiences.

Mothers often can't see right away the newborn because he/she is transferred directly in the NICU. This experience has an effect on maternal ability to cling with the infant; mothers report difficulties in recognizing the baby and in connecting the baby in the NICU to the baby in the womb. The first moment of encounter with the infant is mediated by someone else that has to explain the mother that that particular baby is her baby. Starting from this moment the relationship of the mother with the infant is mediated for days and often for months by others, the staff and the NICU environment itself (Tracey, 2000).

Moreover during their experience in the NICU, parents encounter many physical and psychological barriers in their relationship with the baby. The first barrier is represented by the appearance and behaviors of the premature infant, and the medical equipment that surround him/her, that make mothers feel far from the baby. Mothers have to reorganize also their representations of the infant abandoning the ideal infant in favor of the real newborn, who is characterized by high medical and physical risk. Mothers can't hold their infants when they feel they need to and furthermore preterm infants' attachment signals are difficult to understand. In addition mothers report the inability to perform a normal parenting role in the NICU as a predominant source of distress (Miles & Holditch-Davis, 1997). Many mothers speak of feelings of powerless and alienation as they still feel as if the baby is someone else's baby and they reported insecurity in acting like parents.

This limited parental role and mostly the impossibility to hand their infants as much as other mothers do affect maternal ability to develop a bond with the infant. Mothers feel that they can't even physically get to know their baby and dare not know him/her in an emotional sense (Lupton & Fenwick, 2001). Mothers express concerns related to the bond they feel with the infant, a bond described as different from the expected maternal love. They report the need

to have closeness and proximity to their infants to develop a better and deeper relationship with him/her but at the same time the necessity to keep their feelings hold to be ready for the possibility that infant medical conditions get worse (Nystrom & Axelsson, 2006).

During infant hospitalization, mothers have to cope with the difficulties related to the further continuous separations from their infants. These separations contribute furthermore in affecting mothers' ability to develop a relationship with their infants. This, in turn, may result in delayed maternal attachment as established by previous studies (Feldman et al., 1999; Meijssen et al., 2011).

Solomon and George (George & Solomon, 1999; Solomon & George, 1998) delving into Bowlby's concept of the caretaking behavior system argued that this system is organized to protect the baby and "to keep the infant or child close to the caregiver under conditions of threat or danger (i.e., keep the child safe)" (p. 186). Even though attachment and caretaking require reciprocity, they are distinct from each other and have their own lines of development. As with attachment, caretaking is a behavioral system that is goal-corrected. These behaviors are typically most active during the first few months of the infant's life, and then gradually decrease as the mother's and child's needs change. Changes reflect the infant's natural striving toward independence, and gradually, the parent's necessity to expand her self-interests (i.e., work, spouse, mother to other children). The strategy remains flexible, so that both the child and the mother remain open to potential growth.

This process doesn't fit with the experience of preterm mothers. From the beginning of the mother-infant relationship mothers are not allowed to show caretaking behaviors because the infant is too fragile and they are not considered competent caregivers. It is when the infant is more independent and easier to care that mothers are allowed to play in full their caregiving role. This is exactly the opposite with respect to what happens in a normal motherhood.

Preterm infant mothers start to be completely responsible of their infant's care when the baby is considered completely out of danger and he/she is discharged from the hospital, many days and often months after infant birth (Hall et al., 2012; Weiss, Wilson, Hertenstein, & Campos, 2000). This may represent another critical moment in the transition to parenthood of preterm infant mothers. We can speculate that the complex transition to parenthood of mothers of preterm infants, characterized by the emotional distress of preterm delivery, of the neonatal experience and the perception of the infant as at-risk and vulnerable, as described in Study 1,

may influence the parents' attitude about their child and parents caregiving competence (Miles & Holditch-Davis, 1997). Thus, the different and more characterized by risk indexes interactive styles of preterm infant dyads reported in Study 2, more concerning maternal than infant style, and the more parenting stress reported by preterm mothers in Study 3, could be the result of this process.

Several authors hypothesized that mothers of preterm infants could show a compensatory attitude of overprotection, in relation to their child or in general the feeling of incompetence as caregivers would lead to not sensitive caregiving (Goldberg & DiVitto, 1995; Miles & Carter, 1983; Miles & Holditch-Davis, 1997). Our findings are in line with this hypothesis, mothers of preterm infants show a more active and stimulating interactive style than mothers of full-term infants and they perceive parenting as more stressful (see Chapter 6 and 7).

An interesting aspect of this particular interactive style is that is more mediated by the use of objects than what happens in mother of full-term infants. We can speculate that this reflects also the lack of physical contact these mothers have experienced and the fact that their relationship with the infant has been mediated by something or by someone from the beginning.

Consistent with previous researches this overstimulating interactive style is additionally characterized by more intrusive and less sensitive behaviors compared to mothers of full-term infants interactions at both the ages analyzed (Crnic et al., 1983; Fiese et al., 2001; Schmucker et al., 2005). Very interestingly it seems that having experienced previous traumatic events as abortions and living in more at-risk family conditions influence furthermore the level of maternal intrusive behaviors. This confirms the hypothesis that previous traumatic events could affect maternal early responsiveness and sensitivity.

These intrusive maternal behaviors could put the baby more at risk for future non secure infant-mother attachment as demonstrated by Beebe and colleagues (2010).

Our findings revealed that at 3 months more immature infants are less positive during the interaction with the mother but premature infants in general are not more negative. Their negativity decreases less during time than full-term infant's negativity and at 6 months it is significantly greater. In contrast with studies that described premature infants as characterized by difficult temperaments, our findings let us hypothesizes that the interactive difficulties of preterms could be not only related to prematurity itself but could be a result of preterm infants

characteristics and difficulties in dyadic interactions in line with the transactional model of development (Goldberg & DiVitto, 1995; Kerestes, 2005; Voegtline & Stifter, 2010).

As highlighted in the conclusions of Study 2 the 6 months represent a moment of innovation in mother-infant relationship because the infants, at the beginning of the secondary intersubjectivity phase (Trevarthen & Aitken, 2001), start to direct their attention to objects intentionally. This innovation requires the dyad to reorganize their communications system. Fogel and Garvey (2007) described this as a level 3 developmental change as "the mother-infant relationship shifted from frames involving maternal demonstration of objects to frames involving the infant's more self-directed encounters with objects supported by the mother" (p. 255).

It seems that this transition is harder to accomplish for preterm infant dyads. Mothers maintain their overstimulating interactive style mediated by objects and show a lower predisposition to assume a neutral role during the interaction observing and monitoring infants' autonomous exploration. Furthermore preterm mothers seem less able to reduce their caregiving behaviours from 3 to 6 months of infant's life comparing to what mothers of full-term do.

In the light of these findings it may be hypothesized that a premature infant mother has difficulties in entering in contact whit her preterm infant respecting his/her personal space and grown independence. This led to the emerge of many more interactive risk indicators.

When infants are distressed mothers find harder soothing him and transforming his negative affective states. Instead of restabilising a positive interaction, mother of preterm infants tend to mirror infant negative emotion (Tronick, 1989). This is a pattern previously evidenced in other at-risk dyads (Field, Healy, Goldstein, & Guthertz, 1990; Riva Crugnola et al., 2009; Tronick & Reck, 2009; Tronick et al., 2005). At 6 month of infant age, mothers tend also to show more often positive behaviors when the infant is distressed. Lyons-Ruth and colleagues (1999) found that these affective communication errors (such as mother being positive while infant is distressed) were associated with the disorganized attachment category and other authors, coding face-to-face interaction, similarly reported that maternal tendency to increase stimulation following negative infant cues was positively correlated with infant insecurity of attachment (Fogel, Diamond, Langhorst, & Demos, 1982; Tomlinson, Cooper, & Murray, 2005). Lyons-Ruth's (1999) proposal is that these mothers are unpredictable, so that

the infants have difficulty influencing maternal behavior, and at the same time these mothers are less likely to acknowledge infant distress, by remaining positive when infants are distressed. This hypothesis may fit with the experience of preterm infant mothers and their difficulties in recognizing infant's cues. In general according to these studies, our findings demonstrated that preterm infant dyads could be more at risk for later socio-emotional development problems.

In conclusion the studies included in this dissertation, according to the recent literature review reported in the introduction, show how preterm delivery and the subsequent hospitalization of the infant affect maternal representation of herself as a mother and furthermore influence the process of the development of mother-infant relationship.

8.2 Implications for clinical intervention

Our findings stress that in order to help at best mothers and preterm infants, a transactional approach should be used in developing and implementing preventive interventions. So that parental, infant and socio-demographic risk factors can be taken into account and interventions would be addressed not only to the infant but also the mother and especially the dyad. Furthermore, on a transactional perspective interventions should be focused over the different critical moments mothers and premature infants have to face. Starting from the potentially traumatic experience of delivery through the stressful experience of infant hospitalizations to the difficulties after infant hospital discharge these dyads are more at-risk compared to full-term infant dyads.

With the aim to prevent the onset of these problems, most of all, interventions to support premature infants and their mothers should start from the very first moments of infant's life.

Intervention programs for parents after premature birth, focused on helping the mothers re-elaborating the traumatizing experience of preterm delivery have been shown to reduce the symptoms of traumatization relating to premature birth (Jotzo & Poets, 2005). If parents could overcome the acute emotional crisis after delivery very soon with psychological support, then they would feel more capable of interacting freely and emotionally with their preterm infants and would cope much more easily with the stresses during the neonatal treatment period.

The experience of parenting in the NICU is also characterized by the anticipatory grief for the infant whose life may be in jeopardy. Mothers feel hanging by a thread, they report worries

for the infant survival, development and future quality of life (Meyer et al., 1993). Psychological support to help mothers cope with these worries is extremely needed and should be proactively planned.

Maternal support should start immediately after birth to promote initial moments of positive interaction between mothers and infants. Direct physical contact between mother and infant should be promoted even more strongly immediately after birth and mothers should be assisted during these moments.

This findings confirmed, as revealed by previous studies, how the experiences of preterm delivery and parenting in the NICU environment are very stressful experiences from several points of view (Miles et al., 1993; Miles & Holditch-Davis, 1997). Within the context of the neonatal intensive care, there is a potential for delay in the parent-infant attachment process. Attachment is a complex human experience that requires early physical contact and this is difficult to accomplish in the NICU environment. Procedures based only on essential technology prevalently focused on the infant's medical care do not promote an environment beneficial to parent-infant interactions.

Yet psychological or psychotherapeutic support for parents with preterm infants is still not a routine form of neonatal care. According to our findings the staff, especially the nurses working in neonatal units could play an important role in this regard. Mothers perceive nurses as "gatekeepers" who mediate mothers' relationship with their infants and they rely on nurses to learn how to care at best their infants (Lupton & Fenwick, 2001). Furthermore nurses' behaviors and comments affect strongly mothers' representations of parental efficacy.

In a recent meta-synthesis several recommendations for neonatal nursing, like guided participation in caretaking were proposed: these could be useful in facilitating bonding and increase parent's confidence in caregiving (Aagaard & Hall, 2008).

Written handouts with psycho-educational aspects of coping after very preterm birth and the development of the mother–infant relationship and interaction could be useful as well as clear written documentation about rules and directives about what parents are allowed to do and how in the NICU. Training NICU professionals to appreciate and support the emerging relationship between preterm infants and their parents encouraging parental involvement in the infant's care is another focus to be taken into consideration (Rowe & Jones, 2008; Talmi & Harmon, 2003).

At the same time interventions focused on helping the mothers recognizing infant distress signals and finding different ways to engage infant attention could be useful as previous researches shown (Maguire et al., 2007; Newnham, Milgrom, & Skouteris, 2009). This would help mothers recognizing and responding to infant cues in daily care initiating activity. If mothers are taught to observe and sensitively react to their preterm infants' cues of distress and availability, they could be able to engage infants for longer and in more synchronous and responsive ways. This would in turn reduce the negative and intrusive behaviors reported in Study 2 and prevent maternal perceived stress in parenting the preterm infant evidenced in Study 3 as demonstrated by previous studies (Kaaresen et al., 2006; Meijssen et al., 2010; Newnham et al., 2009).

As a result of these findings, hospital practices focused on the mother-infant relationship and not only to infant medical conditions should be improved.

After infant hospital discharge intervention programs as home visits or group support focused on supporting the mothers in feelings of competence and satisfaction in their children could be useful (Lindberg et al., 2009). According to Meijssen and colleagues (2011) and Ravn and colleagues (2011) this kind of interventions could have an impact also on infant self-regulatory behaviors. The authors reported how mothers who received home visits intervention after hospital discharge assessed their children as happier and less hyperactive/distractible than the control mothers. At the same time interventions focused on mother-premature infant dyads are reported to prevent later cognitive and socio-emotional infant's problems (Brisch et al., 2003)

8.3 Limits of the study

The limitations of this dissertation should be considered when interpreting and applying the findings. Studying parenting in a developmental and longitudinal perspective is a complex research project. Due to the limited resources available, the different studies were not conducted longitudinally on the same sample. We decided to focus our attention on different time points and to conduct different studies with the aim to collect information about the process. Results would be more complete and conclusions more interpretable if the data from the NICU would be connected with data about hospital discharge.

Furthermore the sample of Study 2 is a restricted sample and data about the subjects that refused to participate were not available. We don't know if there are differences between mothers who participated and mothers who decided not to.

Limits of the Web-survey are addressed in the dedicated chapter. This study was exploratory and gave us useful suggestions to plan further investigations on the process explorations of the process. The sample of Study 3 is wider but information is based on maternal recollection instead of hospital records and some doubt could be addressed about the accuracy of this information.

Despite these limitations, the present dissertation study provides a contribution to the study of the phenomenon of parenting preterm infants and of the development of mother-premature infant relationship. These findings could have important implications for the development of preventive interventions for this group of mothers as reported above.

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APPENDIX A

Interview for mothers of preterm infants (translation from the original Italian version).

Subject: date:

INTERVIEW ON PRETERM DELIVERY

Personal information:

Mother:

Name:

Email address:

Telephone Number:

Age :

Education:

Job:

Civil Status :

Father:

Name:

Email address:

Telephone Number:

Age :

Education:

Job:

Civil Status :

Present Address:

The child:

Name:

Date of Birth:

Expected date of the Delivery:

Age at the moment of birth (in days and weeks):

Weight at birth:

Days of hospitalization:

Apgar Index (5 and 10 minutes):

FAMILY COMPOSITION

Are there infant's siblings?

( ) No ( ) Yes:

Name:

Date of birth:

Name:

Date of birth:

THE PREGNANCY

Conception

The pregnancy was planned? ( ) Yes ( ) No

How was maternal status during pregnancy?

( ) single ( ) married ( ) cohabitation with child's father

Was this your first pregnancy ?

( ) Yes ( ) No

If it was not, how many pregnancies did you have?

Did your previous pregnancies reach the term?

( ) Yes ( ) No

Did you have any abortion before this pregnancy?

( ) No ( ) Yes: n° reason:

Did you give birth of dead children? ( ) No ( ) Yes: reason

Did you have more preterm children? ( ) No ( ) Yes: reason

Did you have any multiple pregnancy? ( ) No ( ) Yes

Have you received medical assistance for the conception?

( ) No ( ) Yes which kind:

Gestation

During the pregnancy the mother experienced:

Nausea ( ) No ( ) Yes in which phase:

Vomiting ( ) No ( ) Yes reason:

During the pregnancy were you sick sometimes? (if the mother did please report which illness, in which week of pregnancy and whether the mother has received particular treatments)

Did you experience any of the followings during pregnancy?

( ) x-ray examinations ( ) blood transfusions

( ) followed treatment regimens ( ) smoking

( ) some accidents ( ) drank alcoholic beverages

Consequences:

( ) drug assumption ( ) risk of abortion

( ) faced marital problems, financial or other problems

Would you like to talk about your own pregnancy experience? How did you experience it and how did you feel? Could you figure out some satisfaction aspects about the experience of pregnancy? And lack of satisfaction?

THE DELIVERY

Were you hospitalized for the risk of preterm delivery?

( ) Yes ( ) No

If yes, for how long:

Type of delivery:

( ) normal ( ) forcipes ( ) caesarean ( ) induced

Reason:

Unexpected complications after delivery

( ) No ( ) Yes: which:

Which is your opinion about the reasons for the preterm delivery? You have been given a medical explanation, does this latter match with your own opinion about the reasons why you had a preterm delivery?

Would you like to talk about your own delivery experience? How did you experience it and how did you feel? Could you figure out some satisfaction aspects about the experience of delivery? And lack of satisfaction?

INFANT HOSPITALIZATION

Have you been supported by your husband/partner?

( ) No ( ) Yes:

What kind of support:

Is the rest of the family providing you support?

( ) No ( ) Yes:

What kind:

Would you like to talk about the experience of child hospitalization? How are you experiencing it and how do you feel? Could you figure out some satisfaction aspects about the experience of infant hospitalization? And lack of satisfaction?

MOTHER'S EXPECTATIONS

How did you imagine your child should have been? What aspects of satisfaction do you have about your own child? And lack of satisfaction?

If you think about the future growth of your child, how do you imagine him/her? How would you like the child to be and not want to be? What are you worrying about?

APPENDIX B

The Multidimensional Scale of Perceived Social Support, Italian translation from the original (Zimet et al., 1988).

Nome Madre_____ Nome Bambino_____

Data_____

SUPPORTO SOCIALE PERCEPITO

Siamo interessati a conoscere come Lei si sente rispetto alle seguenti affermazioni.

Legga attentamente ciascuna delle seguenti affermazioni e indichi come si sente rispetto ad esse.

Cerchi **7** se è FORTEMENTE D'ACCORDO

Cerchi **6** se è MOLTO D'ACCORDO

Cerchi **5** se è ABBASTANZA D'ACCORDO

Cerchi **4** se è NE' IN ACCORDO NE' IN DISACCORDO

Cerchi **3** se è ABBASTANZA IN DISACCORDO

Cerchi **2** se è MOLTO IN DISACCORDO

Cerchi **1** se è FORTEMENTE IN DISACCORDO

1)	C'è una persona speciale che mi è vicina quando ho bisogno	1	2	3	4	5	6	7
2)	C'è una persona speciale con la quale posso condividere le mie gioie e i miei dolori	1	2	3	4	5	6	7
3)	La mia famiglia cerca veramente di aiutarmi	1	2	3	4	5	6	7
4)	Ottengo l'aiuto ed il supporto emotivo di cui ho bisogno dalla mia famiglia	1	2	3	4	5	6	7
5)	Ho una persona speciale che rappresenta una vera fonte di conforto per me	1	2	3	4	5	6	7
6)	I miei amici cercano veramente di aiutarmi	1	2	3	4	5	6	7
7)	Posso contare su i miei amici quando le cose non vanno bene	1	2	3	4	5	6	7
8)	Posso parlare dei miei problemi con la mia famiglia	1	2	3	4	5	6	7
9)	Ho degli amici con cui posso condividere le mie gioie e i miei dolori	1	2	3	4	5	6	7
10)	C'è una persona speciale nella mia vita che si prende cura dei miei sentimenti	1	2	3	4	5	6	7
11)	La mia famiglia è disposta ad aiutarmi nel prendere decisioni	1	2	3	4	5	6	7
12)	Posso parlare dei miei problemi con i miei amici	1	2	3	4	5	6	7

APPENDIX C

Modified Perinatal Post-traumatic Stress Disorder Questionnaire, Italian translation from the original (Callahan et al, 2006)

Nome e Cognome…… Data……

Modified Perinatal Post-traumatic Stress Disorder Questionnaire

Scelga con attenzione la risposta che meglio descrive la sua situazione segnando il numero che corrisponde alla sua risposta.

0 = per niente

1= una o due volte

2= qualche volta

3 = spesso, ma per meno di un mese

4= spesso, per più di un mese

1)	Le è capitato di fare incubi ricorrenti sul parto o sul periodo di ricovero del suo bambino in ospedale?	0	1	2	3	4
2)	Le è capitato di avere ricordi sconvolgenti legati al parto o al ricovero del suo bambino in ospedale?	0	1	2	3	4
3)	Le è capitato di rivivere o sentire improvvisamente come se la nascita del suo bambino stesse accadendo di nuovo?	0	1	2	3	4
4)	Ha cercato di evitare di pensare al parto o al ricovero in ospedale del bambino?	0	1	2	3	4
5)	Le è capitato di evitare di fare cose che potrebbero rievocarle le emozioni che ha provato durante il parto o il ricovero del suo bambino in ospedale (per esempio non guardare un programma televisivo sui bambini)?	0	1	2	3	4
6)	Le è capitato di non essere in grado di ricordare qualcosa circa il ricovero del suo bambino in ospedale?	0	1	2	3	4
7)	Le è capitato di nutrire scarso interesse per le attività e i passatempi che era solita fare prima del parto (per esempio ha perso interesse nel suo lavoro o nella sua famiglia)?	0	1	2	3	4
8)	Si è sentita sola e distante dalle altre persone? (per esempio le è sembrato di non essere capita da nessuno)	0	1	2	3	4
9)	Le è diventato più difficile sentire amore e tenerezza verso gli altri?	0	1	2	3	4
10)	Ha avuto difficoltà ad addormentarsi o a riposare a sufficienza?	0	1	2	3	4
11)	Si è sentita più tesa, agitata e facilmente irritabile del solito con gli altri?	0	1	2	3	4
12)	Ha riscontrato maggiori difficoltà nel concentrarti rispetto a prima del parto?	0	1	2	3	4
13)	Si è sentita più eccitabile? (per esempio più sensibile ai rumori, o si sorprendeva più facilmente)	0	1	2	3	4
14)	Si è sentita più colpevole a proposito della nascita del bambino rispetto a come pensava si sarebbe dovuta sentire?	0	1	2	3	4