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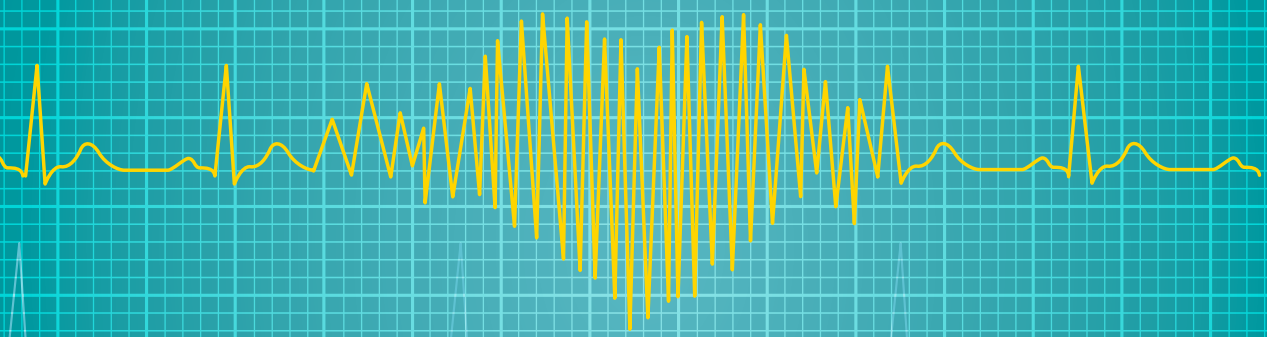

PARENTING ON THE THRESHOLD OF VIABILITY

the impact of preterm birth on parental care

- Hannah Hoffenkamp -

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PARENTING ON THE THRESHOLD OF VIABILITY

The impact of preterm birth on parental care

PROEFSCHRIFT

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in het openbaar te verdedigen ten overstaan van een
door het college van promoties aangewezen commissie
in de aula van de Universiteit

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door

Hannah Nadja Hoffenkamp
geboren op 6 augustus 1982 te Groningen

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Love knows not what time is

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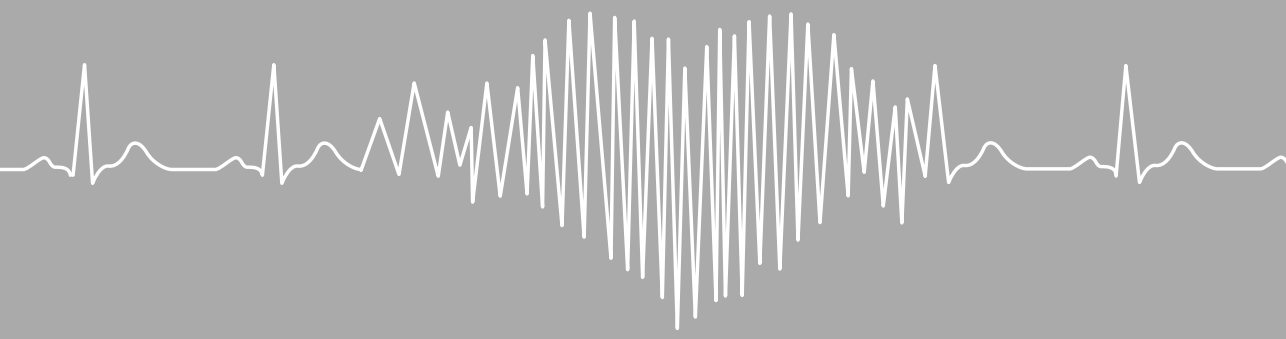
CHAPTER 1

General introduction



INTRODUCTION

Parents of preterm infants face the difficult task of being a parent at a time when both they and their infant are not ready. Infants born before the 37th week of pregnancy come into the world at a time when they are physically not ready for life outside of the womb. They may have difficulty breathing, feeding, and regulating their temperature, because their organs and body systems are underdeveloped. Moreover, they are prone to serious and even life-threatening complications of prematurity (March of Dimes, PMNCH, Save the Children & WHO, 2012). These small and immature infants therefore require days, weeks, or even months of medium, high, or intensive medical care, dependent on their degree of prematurity.

For parents, the early arrival of their preterm infant is often unexpected and overwhelming (Goldberg & DiVitto, 2002). Whereas a healthy term infant is born after 37-42 weeks of physical, mental, and emotional preparation, the birth of an immature preterm infant interrupts parents' preparation process and presents many challenges to parents. Instead of joyful events such as bringing home a new baby to family and friends, parents of preterm infants spend their postpartum days traveling back and forth to a hospital. The adverse birth conditions, such as an unexpected early delivery, the hospitalization of the infant, the infant's distinctive pattern of behavior, and especially the uncertainty about the infant's survival and future development, can all put significant stress on parents (Wereszczak, Miles, Holditch-Davis, 1997; Singer et al., 1999).

Because of the infant's biological risk and the difficult circumstances surrounding early birth, prematurity is recognized as a challenging and sometimes even traumatic complication of birth that can have a profound and long lasting effect on parents (Holditch-Davis, Bartlett, Blickman & Miles, 2003). However, uncertainty exists as to whether these difficulties engendered by the timing of birth impact upon later parenting practices. There is substantive evidence that preterm birth may impede the development of an affectionate parent-infant bond and leads to difficulties in parent-infant interaction (Forcada-Guex, Borghini, Pierrehumbert, Ansermet & Müller-Nix, 2011). Some earlier studies even reported higher incidences of physical abuse and neglect among children with a history of preterm birth (Spencer, Wallace, Sundrum, Bacchus & Logan, 2006). Nevertheless, the mechanisms that underlie the association between preterm birth and disruptions in parenting are poorly understood.

The present thesis aims to shed light on the relation between prematurity and the quality of parental care, as well as the predictive value of parent, infant, and contextual factors for later quality of parenting. Furthermore, this thesis aims to evaluate the effects of an early video-feedback intervention to support the parent-infant relationship after preterm birth.

Prematurity

Each year approximately 15 million infants, that is more than 1 in 10 newborns, are born alive before 37 weeks of gestational age (GA). Of these preterm births, around 84% occur moderately preterm (between ≥32–37 weeks GA) and 16% occur very preterm (<32 weeks GA). The incidence rates of preterm birth vary among regions and countries, but on average 9% of newborns in high-income countries and 12% of newborns in low-income countries are born too early, and incidence rates continue to rise around the world (March of Dimes et al., 2012). Although the exact cause of preterm birth is often unidentified, there are several known risk factors that are associated with preterm labor and/or membrane rupture. These include maternal demographics (e.g., low socioeconomic and educational status, low or high maternal age), behavioral characteristics (e.g., smoking, alcohol, drugs, excessive physical work), psychosocial characteristics (e.g., depression, stressful life events, domestic violence), infection or inflammation (e.g., urinary tract infection, vaginal infection, periodontal infection), physical characteristics (e.g., short cervical length), chronic maternal medical conditions (e.g., diabetes, hypertension), pregnancy history (e.g., previous preterm birth, short inter-pregnancy interval), present pregnancy characteristics (e.g., carrying multiples, pregnancy complications (such as preeclampsia or placental abruption)), nutritional status (e.g., under nutrition, obesity), and biological and genetic markers (e.g., family history of cervical incompetence; Goldenberg, Culhane, Iams & Romero, 2008). Many of these risk factors occur in combination, particularly in socioeconomically disadvantaged populations.

Thanks to medical technological advances, an increasing number of prematurely born infants is currently surviving in high-income countries. Even the survival rates of extremely preterm infants, as young as 24 weeks GA with birth weights below 500 grams, are currently rapidly increasing (March of Dimes et al., 2012). Fortunately, the great majority of preterm infants leaves the neonatal intensive care unit (NICU) to grow up and become healthy adults. Still, infants born on the threshold of viability are extremely vulnerable. Annually more than 1 million newborns die due to complications of prematurity, such as respiratory distress syndrome, intraventricular hemorrhage, necrotizing enterocolitis, infection and sepsis, and seizures (Ward & Beachy, 2003). Furthermore, infants who survive can face lifelong disabilities, such as cerebral palsy, chronic lung disease, blindness, deafness, behavioral problems, emotional delays, and severe intellectual impairment (Saigal & Doyle, 2008). These consequences of prematurity exert a heavy burden on both infants and parents. In particular for very preterm infants, the risk for adverse outcomes increases with decreased gestational age. Because of the high rates of preterm birth and the increased survival chances of very preterm infants, there is a growing concern for infants' (future) quality of life and increasing interest in factors influencing their developmental outcomes.

Parenting under conditions of separation and uncertainty

All new parents face the responsibility of giving their newborn the care needed to thrive and develop to their full potential. Yet parents of preterm infants face the demanding task of providing nurturing care under conditions of separation, uncertainty, and anticipated loss of the infant. The circumstances under which parents of preterm infants need to provide parental care are far more complex than those of parents with an infant born at term gestation.

First, needless to say, the timing of birth is far from optimal. Normally, the relationship between a parent and infant evolves during pregnancy and continues to develop after birth (Brandon, Pitts, Denton, Stringer & Evans, 2009; Laxton-Kane & Slade, 2002). During the third trimester of pregnancy, parents usually start to create an emotional bond with their unborn infant (Ammaniti et al., 1992). They form elaborated representations and expectations about their infant's appearance, characteristics, and behavior. For parents of preterm infants, the early birth suddenly interrupts this process of antenatal bonding with the infant, as well as their psychological preparation for parenthood.

This situation of being unprepared along with the unknown, often constitutes a crisis situation for parents (Caplan, Mason & Kaplan, 2000; Goldberg & DiVitto, 2002). Contrary to former expectations of a normal delivery and a healthy newborn, parents must come to terms with the reality of having a premature infant. The early birth consequently leaves parents torn between mourning the loss of the image of a healthy full grown newborn and celebrating the new life. As a result, parents can experience paradoxical feelings of grief and joy (Golish & Powell, 2003), but also strong feelings of helplessness, sadness, denial, anxiety, depression, frustration, and anger (Miles & Holditch-Davis, 1997; Müller-Nix & Ansermet, 2009), sometimes persisting for months after the infant's hospital discharge (Singer et al., 1999). Moreover, most parents seek to attribute a cause to the event of preterm birth, which frequently results in self-blame by mothers (Golish & Powell, 2003).

Second, not only the unexpected child birth, but also the hospitalization of the infant can have a profound effect on parents. Whilst the use of medical technology is absolutely inevitable and necessary to improve the outcomes of preterm infants, the hospital environment also creates a physical distance between parent and infant. Fortunately, Dutch hospitals now offer 24 hour high-quality family-centered care (including standard options such as kangaroo care) whereby parents are encouraged to be actively involved in the daily care of their infant. Still, prolonged hospitalization of the infant causes a separation between infant and family. Parents' visitation is often limited by the distance from home to hospital (especially when the infant is transferred to a distant referral hospital), and by other responsibilities such as work and the care for siblings. In addition, physical contact with the infant is complicated by medical equipment and a lack of privacy. The infant is placed in an incubator, surrounded by medical personal, and connected to all sorts of tubes and

wires, ventilators, and heart and breathing monitors for life support. Given the difficulty of caring for a vulnerable preterm infant in an incubator, parents rely heavily on the support of medical staff when handling their infant (Müller-Nix & Ansermet, 2009).

Hence, the separation from the infant and the inability to independently care for the infant can be very painful and stressful for parents (Redshaw, Harris & Ingram, 1996; Miles, Funk & Kasper, 1991; Miles & Holditch-Davis, 1997). In particular the inability to help the infant, hold and care for the infant, protect the infant from pain during invasive medical procedures, and share the infant with other family members have been described as sources of emotional strain by parents (Shaw et al., 2006). Parents lose their expected and desired parental role and have to cope with their inability to fulfill normal parental responsibilities (Miles, Funk & Kasper, 1991). This is even more so when the infant is born very premature and its fragile health status hinders physical contact.

Third, obviously one of the most salient and stress provoking aspects of parenting after preterm birth is the infant's immaturity, which varies by gestational age. Because preterm infants are born underdeveloped, they appear frail and weak at birth when compared to their healthier counterparts. With their seemingly transparent skin, limp extremities, low body fat, and poor muscle tone, their appearance can be disturbing to parents (Miles & Holditch-Davis, 1997; Miles, Funk & Kasper, 1991; Schein & Langlois, 2015). Also, the behavior of preterm infants differs markedly from that of term infants. Due to immaturity of the central nervous system, preterm infants are more difficult to bring into an attentive state, and are easily over-aroused when stimulated (Eckerman, Hsu, Molitor, Leung & Goldstein, 1999). They are less alert, display more gaze aversion, and are less able to respond to parents, while at the same time being more fussy, irritable, and difficult to sooth. Because their cues can be difficult to read and interpret, interacting with a premature newborn can be complicated for parents (Eckerman, Hsu, Molitor, Leung & Goldstein, 1999; Wolf et al., 2002).

Moreover, the infant's degree of immaturity is an important indicator of their health status. When reflecting on the preterm birth experience, parents are reported to find the infant's physical appearance along with concerns about the infant's health and survival, the most stress provoking factors (DeMier et al., 2000; Goldberg & DiVitto, 2002; Miles & Holditch-Davis, 1997; Pederson, Bento, Chance, Evans & Fox, 1987). Especially in case of very preterm infants, who are more prone to medical complications, the ever present uncertainty about the infants' medical condition and future outcomes can be extremely difficult to deal with for parents (Müller-Nix & Ansermet, 2009). It has been argued that the anticipation of loss, that is, the awareness of the possibility of future disability and/or death, can even be as challenging and painful as the death of a relative (Rolland, 1990).

Compromised or compensatory care?

There is currently debate as to which of the above mentioned aspects of the preterm birth experience are most likely to put a strain on the parent-infant relationship. Bonding theories, for instance, accentuate the impact of early and prolonged separations between parent and infant, social interaction theories emphasize the interactional limitations of preterm infants, and attachment theories stress the importance of parents' ability to provide nurturing care (Goldberg & DiVitto, 2002).

Furthermore, considerable controversy exits about the impact of preterm birth on the quality of parental care. This is of concern because substantial evidence supports the notion that infant development results from a complex interplay of nature and nurture, and that variations in developmental pathways and outcomes can be at least partly attributed to differences in parenting quality (National Research Council and Institute of Medicine, 2000). Theories of infant development emphasize the influence of the environments in which infants grow and develop and particularly, the essential role of primary caregivers (Bowlby, 1969; Collins, Maccoby, Steinberg, Hetherington & Bornstein, 2000). The quality of parenting substantially affects the infant's mental and physical health, behavior, competence, and its ability to form secure attachments. More specifically, sensitive and responsive parenting behaviors have been found to foster optimal infant developmental trajectories, while insensitive, disengaged, and intrusive parenting have been linked to mal-adaptation, developmental problems, and psychopathology in infants (Teti & Candelaria, 2002; Zeanah & Zeanah, 2009).

Some studies among parents of preterm infants reported that preterm birth impacts negatively on parents' quality of caregiving. It has been found that parents of preterm infants can experience persistent difficulties in bonding and interacting with their newborn (Feldman, Weller, Leckman, Kuint & Eidelman, 1999; Minde, Whitelaw, Brown & Fitzhardinge, 1983). Some parents have been observed to display intrusive and controlling behavior after preterm birth (Forcada-Guex, Borghini, Pierrehumbert, Ansermet & Müller-Nix, 2011; Muller-Nix et al., 2004). Conversely, other parents have been found to experience feelings of "alienation" from their infant and responded to the situation with ambivalence (Jackson, Ternestedt & Schollin, 2003; Müller-Nix & Ansermet, 2009). The event of a preterm birth may be so overwhelming, disturbing, and painful that some parents keep an emotional distance or turn away from their infant to protect themselves from hurt (Feldman, Weller, Leckman, Kuint & Eidelman, 1999). It has been postulated that parents' negative emotions such as disappointment and frustration, may impede the establishment of a well-balanced parent-infant relationship and lead to disruptions in parenting. The hospitalization of the infant (causing early separation) and the specific characteristics of the preterm infant (e.g., poor health, specific behavioral traits), may also set the stage for problems in parental bonding, inadequate interactional behavior, and even abusive or neglectful parenting (see,

Sidebotham, Heron & ALSPAC Study Team, 2003, for a discussion). Consequently, there is evidence that the risk of infant physical abuse and neglect is increased in parents of preterm infants (Spencer, Wallace, Sundrum, Bacchus & Logan, 2006).

In contrast, however, other studies have reported that, despite the difficulties engendered by the timing of birth, most parents are immediately involved with and committed to their preterm infant. These studies demonstrated that parents of preterm infants generally are quite capable of forming an affectionate bond and interacting sensitively with their high risk premature newborn. In some studies the quality of parental interactive behavior was found to be even higher among parents of preterm infants, compared with parents of infants born at term gestation (see, Korja, Latva & Lehtonen, 2012, for a review). These findings suggest that parents might have the ability to provide compensatory care for their vulnerable infant, so as to attenuate the possible adverse effects caused by preterm birth (Beckwith & Cohen, 1978; Wright & Zucker, 1980; Holditch-Davis, Cox, Miles & Belyea, 2003).

Despite the controversies, researchers agree that infant prematurity can complicate parenting, particularly when parents face multiple risk factors such as a low parental education level, lack of social support, inter-parental violence, and family disruption (Trentacosta et al., 2008). This is worrisome because the quality of parenting is of great importance for the developmental outcome of any infant and in particular, for the outcome of highly vulnerable infants, such as those born prematurely (Poehlmann & Fiese, 2001). Prior research already demonstrated that parenting quality is as an important mediating factor between perinatal risk and later infant competencies. Parents can influence infant development even beyond the influences of intrinsic biological characteristics (Zeanah & Zeanah, 2009).

Given the importance of sensitive parental care for infants born preterm, further identification of factors that impact on parents' quality of caregiving seems warranted. Moreover, the potential negative consequences of preterm birth highlight the need for interventions that diminish parental psychological stress responses and promote high-quality parent-infant interactions after preterm birth.

AIMS OF THIS THESIS

The inconclusive and often contradictory findings of earlier studies highlight the need for additional research on the relation between prematurity and the quality of parental care, and on interventions that support parents of preterm infants in their parenting role. The aims of the present thesis were threefold: (1) to examine the impact of moderately (≥32–37 weeks GA) and very (<32 weeks GA) preterm birth on maternal and paternal quality of parenting, (2) to determine the predictive value of parent, infant, and contextual factors related to preterm birth for poor parenting practices, and (3) to evaluate the effectiveness of

hospital-based Video Interaction Guidance (VIG), a preventive video-feedback intervention to support the parent-infant relationship after preterm birth. The present thesis presents the results of four observational studies using data from parents of both term and preterm infants (Chapters 2, 3, 4, and 5), and of one experimental study including only parents of preterm infants (Chapter 6). The observational studies address the first two aims of the study, while the experimental study addresses the third aim of the study.

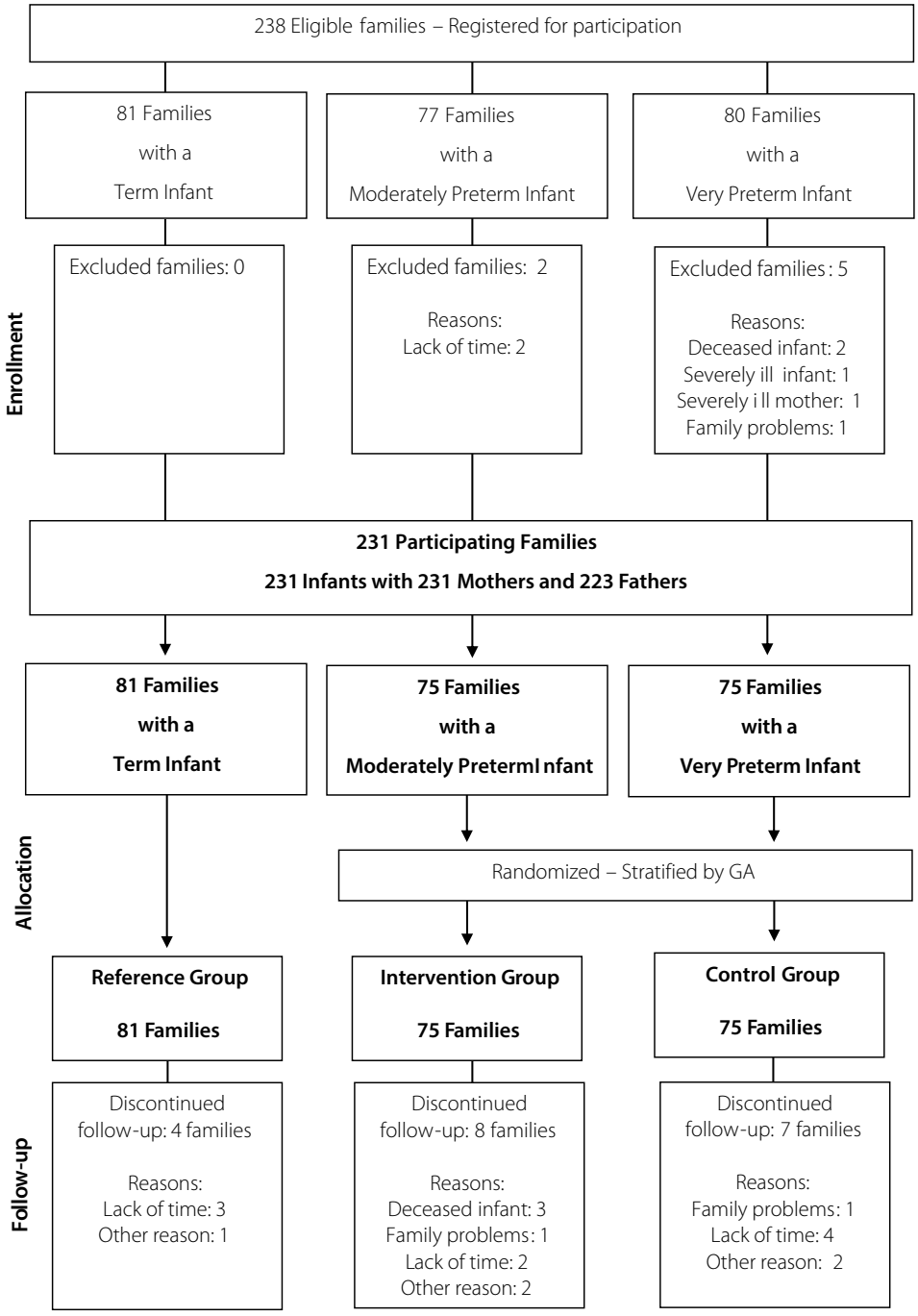
OUTLINE OF THE PRESENT STUDIES

All studies in this thesis were performed within the context of a larger prospective longitudinal research project among parents of term (≥37 weeks GA), moderately preterm (≥32–37 weeks GA), and very preterm (<32 weeks GA) infants, running from 2009 until 2014. The participating families were recruited from eight hospitals (eight maternity wards and two neonatal intensive care units (NICUs)) in the Netherlands, and followed from delivery until two years after birth. The empirical studies described in the next chapters focus on the first six months after birth. A total of 231 families participated in the study, i.e., 231 mothers, 223 fathers, and 231 infants of whom 81 were born at term, 75 were moderately preterm, and 75 were very preterm. Figure 1.1 displays the participant flow.

To examine the association between preterm birth and parenting, a wide range of behavioral and psycho-social measures were collected from all participating parents. Parenting quality, the primary outcome of the study, was captured by multiple variables. More precisely, to assess parental bonding we used self-report data, parental interactive behavior was evaluated using observational data, and for the measurement of attachment representations we used interview data. Other information collected included infant medical data, parental demographic data, interview data on parental experiences and perceptions, and parental self-report data on emotions, well-being, and distress. The longitudinally collected data from parents of both term and preterm infants were used to examine the association between birth experiences and (future) parenting, whereas a randomized controlled trial (RCT) was conducted to examine the effects of VIG in parents of preterm infants.

For a more detailed description of the study design, procedure, participants, and measures, see the study protocol by Tooten et al. (2012) and the separate studies described in the next chapters.

Figure 1.1 Participant flow



OUTLINE OF THIS THESIS

Following this introductory chapter, **Chapter 2** approaches the subject of parent-infant bonding from an evolutionary perspective, and examines the process of parental bonding after term, moderately, and very preterm birth. **Chapter 3** examines if the event of preterm birth provides a context for the development of less than optimal parental interactive behavior, by examining the predictive value of parent, infant and contextual factors related to preterm birth. **Chapter 4** focuses on maternal postpartum psychological distress, and investigates whether heightened levels of maternal distress after preterm birth place mother-infant dyads at risk for poor parenting. **Chapter 5** examines risk factors for disrupted attachment representations in parents of term and preterm infants. **Chapter 6** evaluates the effectiveness of hospital-based VIG, a preventive video-feedback intervention to support the early parent-preterm infant relationship. **Chapter 7** concludes the thesis with a summary and discussion of the main findings.

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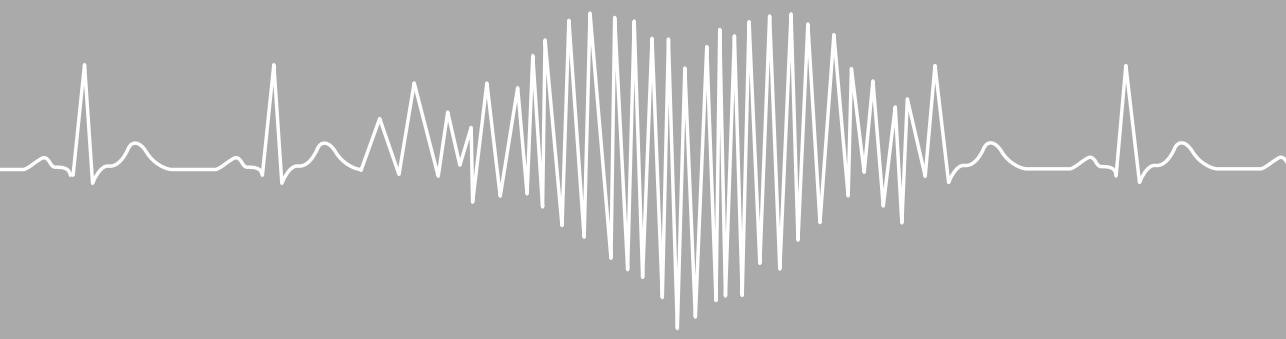
CHAPTER 2

The impact of premature childbirth on parental bonding



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ABSTRACT

Objective. The development of an affectionate parent-infant bond is essential for a newborn infant's survival and development. However, from evolutionary theory it can be derived that parental bonding is not an automatic process, but dependent on infants' cues to reproductive potential and parents' access to resources. The purpose of the present study was to examine the process of bonding in a sample of Dutch mothers (N = 200) and fathers (N = 193) of full-term (n = 69), moderately premature (n = 68), and very premature infants (n = 63).

Method. During the first month postpartum parents completed the Pictorial Representation of Attachment Measure (PRAM) and Postpartum Bonding Questionnaire (PBQ). Structural equation modeling was applied to analyze the repeatedly measured multiple group data on the PRAM scores. In addition, the convergent validity between the PRAM and the PBQ was examined.

Results. The longitudinal analyses revealed that mothers' PRAM scores decreased after moderately preterm delivery, whereas decreases in PRAM scores occurred in both parents after very preterm delivery. As lower PRAM scores represent stronger feelings of parent-infant connectedness, our findings suggest a higher degree of bonding after premature childbirth. Results of the PBQ analysis were in line with PRAM outcomes, as parents of preterm infants reported less bonding problems compared to parents of full-terms.

Conclusions. These findings support the hypothesis that in affluent countries with adequate resources, bonding in parents of preterm infants on average may be higher than in parents of full-term infants.

INTRODUCTION

Compared to all other species, human neonates are particularly immature, helpless and reliant on parental investment (Zeveloff and Boyce, 1982). This extreme altriciality makes infants require extensive care for many years, as to feeding, protection, stimulation, and affection (Pavard, Koons and Heyer, 2007; Pavard, Sibert, and Heyer, 2007). The process of bonding, in which parents form an emotional bond or tie with their infant, is thus essential for the infant's survival and development, as the development of an affectionate parent-infant relationship enhances parental investment (Hrdy, 1999; Kennell and Klaus, 1998).

However, that is not to say that parental bonding and commitment to offspring is an innate and automatic process. The essentialist presumption that parents, in particular mothers, are genetically pre-programmed to nurture babies has been subverted by the observation that parents may be reluctant to take care of their offspring (Daly and Wilson, 1984, 1988; Hrdy, 1999). Parents may love their newborn baby deeply and passionately, but often not unconditionally, in order to maximize investment returns (Hrdy, 1999; Solomon and George, 1996). Cross-cultural research shows that parental neglect, abuse and even infanticide do occur in infants with poor survival prospects, either due to ill health or detrimental circumstances (Daly and Wilson, 1984, 1988; Soltis, 2004).

From an evolutionary perspective, parental investment depends on the total energy and resources that a specific infant requires at the expense of other offspring or family members (Trivers, 1972). Both the parent's and infant's reproductive value, as well as the impact of the investment on the infant, seem to influence parental investment decisions, along with circumstances parents are in, such as their access to resources (Daly and Wilson, 1984, 1988; Salmon, 2005; Trivers, 1972). Since parents have the ability to distinguish infant characteristics linked to reproductive potential and consider outcomes in this respect, parental bonding may be affected by certain features and health status of the infant (Hrdy, 1999; Kennell and Klaus, 1998; Miles, Funk, and Kasper, 1991; Soltis, 2004). In particular uncertainty about the health- and developmental outcome of an infant may delay and disrupt bonding in parents (DeMier et al., 2000). As a way of coping, and in an attempt not to be overwhelmed by emotions, parents of sick and premature infants may keep their infant at a distance or, alternatively, over stimulate their infant to elicit a reassuring reaction from their baby (Borghini et al., 2006; Feldman and Eidelman, 2006; Muller-Nix and Ansermet, 2009; Pierrehumbert and Nicole, 2003). So, parental bonding may be delayed until the infant's physical condition appears to be improved and the infant's survival seems assured (Robson and Kumar, 1980). This implies that handicapped, sick, or premature infants, who require additional parental care in terms of time, money, and attention, run an increased risk of non-optimal parenting, neglect, or even abuse in comparison with their healthier counterparts (Daly and Wilson, 1984, 1988; Hrdy, 1999; Tifferet, Manor, Constantini, Friedman, and Elizur, 2007).

With prematurity (birth before 37 weeks gestation) as the most prevalent cause of infant morbidity and mortality in industrialized countries (Muller-Nix and Ansermet, 2009; WHO global action report, 2012), preterm infants represent a vulnerable group at risk for parental withdrawal of investment. With an estimated incidence rate of 11.1% worldwide, preterm birth is considered to be a global public health problem. Variation in preterm birth rates among regions and countries is considerable, but on average rates are highest in low- and lower middle-income countries (11.8% and 11.3%), and lowest in upper middle- and high-income countries (9.4% and 9.3%; WHO global action report, 2012).

Preterm birth is increasingly acknowledged as a very emotional, stressful and demanding experience for parents (Muller-Nix and Ansermet, 2009). During the days, weeks or even months of hospitalization of a premature infant, parents are often overwhelmed by a range of emotions, from feelings of helplessness, anxiety and depression, to frustration, guilt, and anger (Muller-Nix and Ansermet, 2009). In parents of preterm infants, especially the visible, external infant characteristics and signals associated with immaturity and severity of medical status can cause apprehension and impaired bonding, as they indicate reduced survival chances (DeMier et al., 2000; Hrdy, 1999; Muller-Nix and Ansermet, 2009; Young Seideman et al., 1997). With their low birth weight and less infantile ("babyish") facial features, the appearance of preterm infants is judged as less cute and physically attractive than the features of full-terms (Hildebrandt and Fitzgerald, 1979; Goldberg and DiVitto, 2002). Moreover, parents might encounter difficulties in interacting with their immature preterm infant, as they are relatively irritable, show mixed behavioral signs, and exhibit more sensory-defensive behaviors; while at the same time being less active, alert, and responsive to parents' solicitations than full-term infants (Case-Smith, Butcher and Reed, 1998; Eckerman, Hsu, Molitor, Leung, and Goldstein, 1999; Friedman, Jacobs and Werthman, 1982; Goldberg and Di Vitto, 2002; Muller-Nix and Ansermet, 2009). In addition, it has been found that the crying of preterm infants, which contains information about their level of current distress as well as overall fitness, is perceived as more aversive and physiologically arousing to mothers (Frodi, Lamb, and Wille, 1981; Soltis, 2004). Consequently, all of these infant characteristics and signals can hinder parental bonding, as parents may hesitate to bond with a preterm infant with poor survival prospects and possible developmental difficulties. Emotional detachment in parents can subsequently lead to selective neglect of the infant and withdrawal of investment (Mann, 1992).

Fortunately, in developed countries today, reduced infant health status is unlikely to result in complete withdrawal of parental investment or infanticide (Daly and Wilson, 1988; Soltis, 2004). For most newborns, although highly contingent on circumstances, parental care giving is not being compromised by initially negative responses to specific infant attributes such as low birth weight, physical appearance, or infant crying. Nevertheless, the risk of delayed bonding and parental distancing as well as non-optimal parenting, including

child abuse and neglect, is still increased for sick infants (Feldman, Weller, Leckman, Kuint, and Eidelman, 1999; Hrdy, 1999; Soltis, 2004).

The notion that prematurity and related compromised infant health status can impede parental care and bonding, is not a recent observation (Bell, 2001). In one of the earliest known treatises on gynecology, the Greek physician Soranus of Ephesus (circa AD 98-138) already described "how to recognize the newborn that is worth rearing". Soranus (1991) provided specific criteria for midwives to distinguish healthy newborns from weak, malformed or diseased infants. He determined that the newborn "suited by nature for rearing" should have: a mother who "spent the period of pregnancy in good health", be "born at the due time, best at the end of nine month", should "immediately cry with proper vigor" after birth, and be "perfect in all its parts, members and senses" (pp. 79-80).

While Soranus' evaluation system may appear obsolete and even inhuman to us at the present time, the suggested criteria still seem valid predictors of infant survival. Even though objectives are completely different, the criteria for infant fitness as provided by Soranus centuries ago show remarkable resemblance to APGAR-scores, which are currently used for newborn health assessment (Finster and Wood, 2005). Moreover, parents' perceptions of a newborn infant, with subsequent levels of parental investment and commitment, are still affected by infant health status and prematurity (Dubas, 2010; Muller-Nix and Ansermet, 2009). Based on cognitions and perceptions parents have about their infant, they face the dilemma of whether to increase investment in their premature infant in need for additional care to improve the infant's health outcomes, or to minimize care in order to invest in other (future or concurrent) offspring with more reproductive potential (Mann, 1992). According to Mann (1992), moderate parental investment in a high-risk infant may be the worst alternative to this trade-off, as moderate care for these infants does involve costs but with reduced investment returns.

The most important factor influencing the decision for parental investment in a premature infant is parents' access to care giving resources (Mann, 1992; Bugental, Beaulieu and Corpuz, 2012). Resources that influence parental investment may be material (e.g. money, nutrition), social (e.g. spousal support), skill based (e.g. parenting experience), temporal (e.g., availability of time), and attentional or emotional (e.g., parental attention or emotional engagement, which is for instance dependent on parents' own mental and physical health status) (Bugental et al., 2012; Mann, 1992; Pavard et al., 2007). With limited resources and unfavorable child rearing circumstances, parents are more likely to show reduced investment in their infant compared to parents with adequate resources (Bugental et al., 2012; Daly and Wilson, 1988; Mann, 1992). On the other hand, when parents do have access to abundant resources, they can afford to invest additional time, money and attention in a high-risk infant, while still having enough care giving resources available for other children and family members (Mann, 1992; Beaulieu and Bugental, 2008). Moreover,

Bugental and Beaulieu (2003; Beaulieu and Bugental, 2008) proposed that differential parental investment in high-risk infants involves a contingent pattern, whereby parents with adequate resources are expected to even invest preferentially in a high-risk infant with low reproductive value. In that way they increase the probability of infant survival and thus their reproductive success. The authors found support for a contingent model of parental investment concerning the interactive effects of maternal attentional resources (depression) and infant risk status (prematurity). They observed that mothers with high personal resources were more likely to invest in an infant with cues to low reproductive potential (Beaulieu and Bugental, 2008).

To date, few previous studies have reported high levels of care giving in mothers of premature infants attempting to compensate for the negative consequences of preterm birth. While there still is controversy about the effect of prematurity on the parent-infant relationship, and most researchers only emphasize the negative consequences of premature birth, increased maternal investment as well as consistent maternal attention have been demonstrated in mothers of premature children (Beckwith and Cohen, 1978; Wright and Zucker, 1980). Observations of additional parental investment in high-risk infants resulted in a theory of compensatory care, suggesting that there is increased parental care giving behavior to sick and high-risk infants to attenuate the effect of hazardous events (Beckwith and Cohen, 1978). Thus, dependent on parents' resources, prematurity actually may stimulate more parental care and investment instead of increasing disinterest and non-attachment (Wright and Zucker, 1980). In a study among a heterogeneous sample of premature infants at one month corrected age, it was observed that infants with more serious medical problems, born with a lower birth weight and low gestational age, received more care giving behavior from their mothers compared to their healthier counterparts (Beckwith and Cohen, 1978). Also, an experimental study in which mothers of full-terms were compared to mothers of preterm infants demonstrated that mothers of premature infants, and in particular mothers who were separated from their infant immediately after birth, touched and attended more to their children than mothers of full-term infants by 21 month follow-up assessment (Leiderman, 1981; Myers, 1984).

Furthermore, there is an ongoing debate about the quality and quantity of mother-preterm infant interaction. Whereas various authors have described mothers of preterm infants as less sensitive, more intrusive, and at the same time more disengaged than mothers of full-term infants, other researchers described them as relatively competent in their interaction (Muller-Nix and Ansermet, 2009). A recent literature review by Korja, Latva, and Lehtonen (2012) revealed that 5 out of 18 studies reported an equal or even higher quality of mother-infant interaction in preterm dyads, compared to full-term dyads.

To date, there is only limited data available on fathers of preterm infants, though it has been suggested that fathers of preterm infants in the first months postpartum are more

involved with their infant in comparison with fathers of full-terms (Brown, Rustia, and Schappert, 1991; Harrison, 1990). This could be explained by the fact that fathers of premature infants have a unique responsibility and supporting role, especially in the beginning when their infant is still hospitalized and the mother is recovering from pregnancy and delivery (Goldberg and DiVitto, 2002).

With prematurity as a leading global cause of perinatal mortality and disability, increasing global incidence rates of preterm birth, and increased survival rates of very preterm infants, there is growing concern for the impact of preterm childbirth on both infants and parents (Muller-Nix and Ansermet, 2009; WHO global action report, 2012). Given the fact that premature birth can be a very traumatic event for parents, with significant implications regarding parents' representations and care giving competencies, examining the process of bonding in this population is of key importance (Pierrehumbert and Nicole, 2003). In particular, since the quality of the early parent-infant relationship is considered to be a significant mediating factor between the infant's perinatal risk status and developmental outcome, the parent-infant bond can worsen or soften the impact of premature childbirth (Forcada-Guex, Pierrehumbert, Borghini, Moessinger, and Muller-Nix, 2006; Singer et al., 2003).

As previous studies remained inconclusive concerning the impact of preterm childbirth on the parent-infant relationship, the purpose of the present study is to further examine the process of bonding in Dutch parents with full-term, moderately preterm, or very preterm infants on three occasions after birth. From evolutionary theory it could be derived that in the Netherlands, currently a high-income country with comparably abundant resources, parental bonding with preterm infants could on average be expected to be higher than with full-terms. Moreover, as most research solely focuses on the mother-infant relationship, the secondary aim of the study is to explore possible differences in bonding between mothers and fathers of full-term and preterm infants. Given the findings of previous studies on the father-infant relationship, we hypothesize fathers of preterm infants to show relatively high levels of bonding as they fulfill the demanding caretaking role during the infant's hospital stay.

METHOD

Participants

This study is part of a larger longitudinal study on families with premature infants and the effectiveness of video interaction guidance after premature childbirth, conducted in eight hospitals in the Netherlands (Tooten et al., 2012). Both mothers (N = 200) and fathers (N = 193) of full-term (n = 69), moderately premature (n = 68), and very premature infants (n = 63) participated in the study, after having been invited within 24 hours after birth of their child. Infants born at less than 37 completed weeks of gestational age (GA) were classified as premature regarding international norms. Infants with less than 32 weeks GA

were considered very preterm, as these infants in particular are at risk for mortality, health problems and developmental difficulties (Muller-Nix and Ansermet, 2009). Full term infants (≥ 37 weeks GA) and moderately preterm infants (≥ 32 - < 37 weeks GA) and their parents were recruited from maternity wards of the participating hospitals. Very preterm infants (< 32 weeks GA) and their parents were recruited from the neonatal intensive care units (NICU) of two specialized hospitals. Nurses from the participating hospitals informed the parents about the design and aims of the study, while providing them a written information brochure. All parents who participated in the study gave their written consent. Parents with poor understanding of the Dutch language were excluded from participation. The study protocol was approved by the Medical Ethical Committee of the Catharina Hospital in Eindhoven. Mean dropout rate 1 month postpartum was 9%.

Measures and procedure

To assess parent-infant bonding in parents of full-term as well as preterm infants, parents were asked to individually complete the *Pictorial Representation of Attachment Measure* (PRAM: Van Bakel, Vreeswijk, and Maas, 2009; Vreeswijk, Vingerhoets, and Van Bakel, 2010) at three measurement occasions. Van Bakel and colleagues developed this measure to assess the nonverbal representation of antenatal attachment or bonding between parents and their offspring. The PRAM is a modified version of the Pictorial Representation of Illness and Self Measure originally developed and validated by Büchi and colleagues (Büchi, Sensky, Sharpe, and Timberlake, 1998; Büchi et al., 2002). The concept of bonding is complex and multi-faceted in origin, yet the PRAM attempts to provide a visual representation of the relationship between the parent and the baby. The measure consists of a white A4-format paper with a big circle in the center (diameter of 18.6 cm.). The big circle symbolizes the current life of the parent. A smaller circle (diameter of 5.3 cm.), in the middle of the big circle, represents the parent's "self." The task of the parents was to place a grey round sticker (diameter of 5 cm) that symbolized their newborn baby somewhere in the big circle representing their life. Parents received written instructions concerning the PRAM task, requesting them to reflect on the importance of the newborn infant for him or her. They were asked specifically "Where would you put the baby in your life at this moment?" The quantitative outcome *PRAM Self-Baby Distance* (PRAM-SBD), i.e., the distance between the midpoints of the self-circle and the baby-circle, is reported in millimeters with a possible range of 0 to 93mm. Based on the results of Van Bakel et al. (2009) and Vreeswijk et al. (2010), lower PRAM-SBD scores are assumed to indicate a higher degree of parent-infant bonding and feelings of connectedness. Higher PRAM-SBD scores reflect more emotional distancing towards the newborn infant. This test was applied three times after birth: 1 day, 1 week, and 1 month postpartum.

In addition, all parents were asked to complete the *Postpartum Bonding Questionnaire* (PBQ; Brockington et al., 2001) 1 month postpartum. This instrument has been designed for early diagnosis of mother-infant relationship disorders. To further validate the PRAM and test the hypothesis that it also examines feelings of parental bonding in our study population, the convergent validity between the two measures was analyzed. Correlations between parents' outcomes on the PRAM and the Postpartum Bonding Questionnaire (PBQ) subscale Impaired Bonding were computed 1 month postpartum, as both instruments measure related theoretical constructs. In a validation study, the PBQ subscale Impaired Bonding, consisting of 12 questions on a 6-point Likert scale, was found to be sensitive in identifying mothers with bonding disorders (Brockington, Fraser, and Wilson, 2006). In both the PRAM and PBQ, low scores reflect a higher degree of parental bonding (closeness), whereas high scores represent bonding difficulties (distance).

Statistical analysis

Structural Equation Modeling (SEM) through AMOS statistical software was applied to analyze the repeatedly measured multiple group data on PRAM-SBD scores (Bollen and Curran, 2006). Full-information maximum likelihood-based parameter estimates (MLE) of observed scores were used to handle missing data. This method was selected since an analysis of the repeated measures data by means of the SPSS procedure GLM (Repeated Measures), which applies list-wise deletion of cases, would have resulted in a loss of observations and a reduction of sample size in each of the three groups. Analysis by means of the SEM program AMOS makes use of all observed scores and does not delete cases with missing scores from the data set, and provides full-information maximum likelihood estimation and hypothesis testing for the repeated measures data. In contrast to traditional ANOVA analyses, hypothesis testing is not based on *F*-tests but on chi-square tests. PRAM-SBD scores were analyzed for mothers and fathers simultaneously. By treating the family as the unit of analysis, PRAM-SBD outcomes of mothers and fathers were allowed to be correlated. The analyses reported below were carried out separately for the three different groups. In parents of twins, only PRAM-SBD scores concerning the first born infant were included in the analysis. Socio-demographic and clinical data were tested for differences between the participants of the three groups using chi square analyses for categorical variables and one-way between groups analysis of variance (ANOVA) for continuous variables. Since this study was part of a larger longitudinal study on the effectiveness of video interaction guidance, we also analyzed the effect of the intervention on PRAM-SBD scores. However, this factor was not taken into account in the further analysis, because analyses failed to yield any significant differences between the experimental and the control group.

Furthermore, to establish convergent validity of the PRAM for mothers and fathers, Pearson product-moment correlations between the PRAM and the PBQ subscale Impaired

Bonding were calculated 1 month postpartum by means of SPSS statistical software. In addition, one-way ANOVAs with post-hoc comparisons were conducted to analyze group differences on the mean PBQ Impaired Bonding scale scores.

RESULTS

Infant birth data and parental demographic data

Participants' background characteristics for the three study groups are reported in Table 2.1. Preliminary analyses did not reveal significant differences among the three groups on nationality and marital status of parents, nor on infant gender. Obviously, the preterm infants had significant lower gestational age [$F(2, 193) = 737.29$, $p < .001$], lower birth weight [$F(2, 194) = 308.75$, $p < .001$], lower 5-minute APGAR scores [$F(2, 190) = 37.73$, $p < .001$], more days spent in an incubator [$F(2, 187) = 190.90$, $p < .001$], along with a higher reported mortality rate in the group of very premature infants [$F(2, 197) = 5.82$, $p = .004$]. Also, significantly more premature infants were part of a twin pair [$X^2 = 9.62$, $p = .008$]. Furthermore, significant differences were found between the three groups on parental educational level, as parents of premature infants were on average lower educated [maternal educational level: $F(2, 190) = 7.41$, $p = .001$; paternal educational level: $F(2, 178) = 3.30$, $p = .039$]. Parents of premature infants were on average also younger [maternal age: $F(2, 191) = 5.10$, $p = .007$; paternal age: $F(2, 180) = 3.83$, $p = .023$]. In addition, premature infants were more often first born children for mothers (with twin birth counted as a single event) [birth order mothers: $F(2, 192) = 5.82$, $p = .004$]. Given these significant differences among the three groups, we checked whether these variables were significantly related to PRAM-SBD baseline scores. Regression and multivariate analyses did not reveal any significant relations among group, parental demographic variables (i.e., educational level, age and birth order) and PRAM baseline findings.

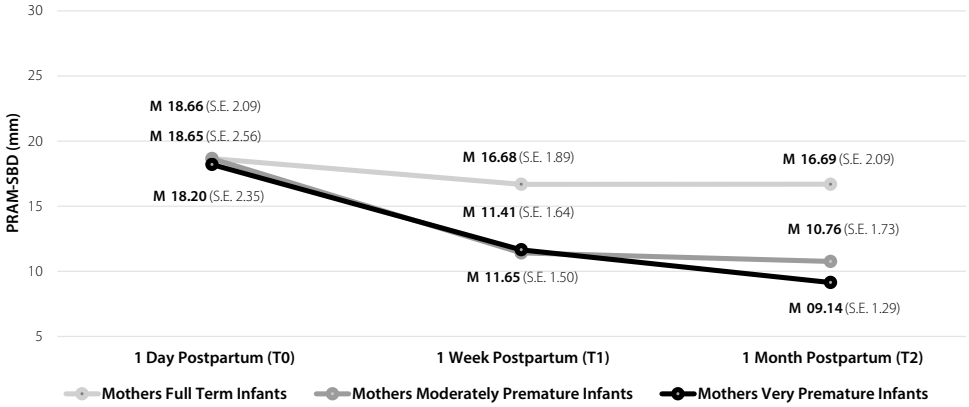
Repeatedly measured multiple group data on PRAM-SBD scores

Figures 2.1 and 2.2 show, respectively, mothers' and fathers' maximum likelihood estimates (MLE) of PRAM Self-Baby-Distance (PRAM-SBD) scores for full-term, moderately premature and very premature infants. PRAM-SBD scores were collected repeatedly over time: a baseline assessment (T0) 1 day after birth, and follow-up measurements at 1 week (T1) and 1 month (T2) postpartum.

Table 2.1 Characteristics of study participants

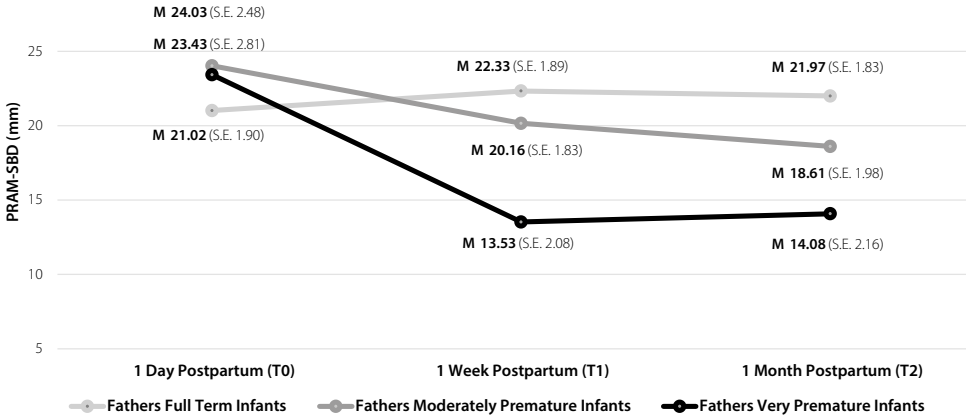
	Full Term infants	Moderately Preterm infants	Very Preterm infants	Total
Infant birth data, *n*	**69**	**68**	**63**	**200**
Male sex, *n*	35 (50.7%)	39 (57.4%)	34 (54%)	108 (54%)
GA at birth, *mean, wk*	39.49	34.50	29.38	34.61
GA at birth, *range*	37 - 42.14	32.14 – 36.71	25.14 – 32.14	25.14 – 42.14
Birth weight, *mean, gr*	3405	2293	1293	2362
Birth weight, *range*	1775 - 4865	1220 - 4280	556 - 2220	556 - 4865
5-min APGAR, *mean*	9.65	9.23	7.9	8.96
Incubator, *mean, days*	.28	7.89	39.16	14.38
Singleton, *n*	66 (95.7%)	55 (80.9%)	49 (77.8%)	170 (85%)
Deceased infants, *n*	0 (0%)	0 (0%)	5 (7.9%)	5 (2.5%)
Maternal demographic data				
Mothers, *n*	**69**	**68**	**63**	**200**
Maternal age, *mean, yr*	33.57	31.39	31.08	32.06
Birth order, *mean*	1.65	1.39	1.27	1.45
Nationality Dutch , *n*	63 (91.3%)	66 (97.1%)	58 (92.1%)	187 (93.5%)
Educational level, *n*				
Low	6 (8.7%)	11 (16.2%)	12 (19%)	29 (14.5%)
Medium	15 (21.7%)	27 (39.7%)	25 (39.7%)	67 (33.5%)
High	48 (69.6%)	28 (41.2%)	21 (33.3%)	97 (48.5%)
Unknown	0 (0%)	2 (2.9%)	5 (7.9%)	7 (3.5%)
Paternal demographic data				
Fathers, *n*	**68**	**66**	**59**	**193**
Paternal age, *mean, yr*	35.79	33.78	33.39	34.38
Birth order, *mean*	1.66	1. 47	1.34	1.50
Nationality Dutch, *n*	65 (95.6%)	63 (95.5%)	54 (91.5%)	182 (94.3%)
Educational level, *n*				
Low	14 (20.6%)	15 (22.7%)	16 (27.1%)	45 (23.3%)
Medium	14 (20.6%)	15 (22.7%)	19 (32.2%)	48 (24.9%)
High	40 (58.8%)	32 (48.5%)	16 (27.1%)	88 (45.6%)
Unknown	0 (0%)	4 (6.1%)	8 (13.6%)	12 (6.2%)
Marital status, *n*				
Married /Reg. partners	43 (62.3%)	39 (57.4%)	31 (49.2%)	113 (56.5%)
Cohabiting	25 (36.2%)	26 (38.2%)	24 (38.1%)	75 (37.5%)
Single / Divorced	1 (1.5%)	1 (1.5%)	5 (7.9%)	7 (3.5%)
Unknown	0 (0%)	2 (2.9%)	3 (4.8%)	5 (2.5%)

Figure 2.1 MLE of PRAM-SBD scores (means and standard errors in millimeters) in mothers ($N = 200$) of full-term ($n = 69$), moderately preterm ($n = 68$), and very preterm infants ($n = 63$); assessed 1 day, 1 week, and 1 month postpartum



Note: lower scores reflect parental bonding (closeness); higher scores reflect bonding difficulties (distance).

Figure 2.2 MLE of PRAM-SBD scores (means and standard errors in millimeters) in fathers ($N = 193$) of full-term ($n = 68$), moderately preterm ($n = 66$), and very preterm infants ($n = 59$); assessed 1 day, 1 week, and 1 month postpartum



Note: lower scores reflect parental bonding (closeness); higher scores reflect bonding difficulties (distance).

Table 2.2 summarizes the results of statistical tests of the null hypothesis that mean PRAM-SBD scores do not change over time, which corresponds to a flat/horizontal time profile. Chi-square tests with 2 degrees of freedom were carried out separately for mothers and fathers, as well as for the three groups of infants. For both mothers and fathers, the three groups did not differ from each other on PRAM-SBD scores at the first measurement (T0) (see Table 2.3). For full-term infants, neither mothers nor fathers showed a significant change in PRAM-SBD

scores over time, whereas for moderately preterm infants a significant decrease only in the mother's PRAM-SBD scores was observed during the first month postpartum (see Figure 2.1). In addition, both mothers and fathers of very premature infants showed a significant decrease in PRAM-SBD scores during the first month after birth (see Figures 2.1 and 2.2).

Table 2.2 Longitudinal model for change over time in PRAM-SBD scores in mothers (*n* = 200) and fathers (*n* = 193) of full-term, moderately preterm, and very preterm infants (significance tests for hypothesis of no difference between time points (df = 2))

Group	Mothers		Fathers	
	CMIN	*P*	CMIN	*P*
Full terms	1.72	.424	0.73	.694
Moderately preterms	10.61	.005	3.38	.185
Very preterms	17.25	<.001	17.26	<.001

Table 2.3 displays the statistical test results of the null hypothesis of no group differences on PRAM-SBD scores at the three time points. One day after birth (T0), no effect of prematurity was found. However, 1 week (T1) and 1 month (T2) postpartum, the groups differed significantly from each other concerning PRAM-SBD outcomes. It was found that mothers of moderately premature and mothers of very premature infants on average had lower PRAM-SBD scores than mothers of full-term infants at 1 week (T1) and 1 month postpartum (T2). Fathers of moderately premature infants did not differ from fathers of full-term infants regarding PRAM-SBD scores. Yet, fathers of very premature infants on average had lower PRAM-SBD scores compared to fathers of full-terms at 1 week (T1) and 1 month postpartum (T2).

Table 2.3 Differences between full-term – moderately preterm infants, and full-term – very preterm infants, on mothers' and fathers' PRAM-SBD scores at three measurement occasions (significance tests for hypothesis of no difference between full-term infants and preterm infants (df = 1))

Occasion	Mothers				Fathers			
	Full terms vs Moderately preterms		Full terms vs Very preterms		Full terms vs Moderately preterms		Full terms vs Very preterms	
	CMIN	*P*	CMIN	*P*	CMIN	*P*	CMIN	*P*
T0 1 Day postpartum	0.00	.997	0.02	.884	0.92	.338	0.50	.481
T1 1 Week postpartum	4.37	.037	4.27	.039	0.68	.409	9.47	.002
T2 1 Month postpartum	4.72	.030	8.99	.003	1.54	.215	7.38	.007

Differences between mothers and fathers on PRAM-SBD scores

Table 2.4 summarizes the results of the tests of the null hypothesis that mothers and fathers do not differ in bonding with their newborn. Chi-square tests with 1 degree of freedom were carried out separately for the three infant groups and measurement occasions. For full-term as well as moderately premature infants, clear significant differences between mothers' and fathers' PRAM-SBD scores were observed at one week (T1) and one month (T2) after birth, with lower PRAM-SBD scores for mothers; while at baseline (T0) these groups did not differ from each other regarding PRAM outcomes. For very premature infants, lower PRAM-SBD scores were found for mothers compared to fathers at 1 day (T0) and 1 month (T2) after birth, but differences between parents were small and marginally significant. There were no differences in PRAM scores between mothers and fathers of very preterm infants 1 week postpartum (T1).

Table 2.4 Differences between mothers and fathers on PRAM-SBD scores at three measurement occasions for full-term, moderately preterm and very preterm infants (significance tests for hypothesis of no difference between mother and father (df = 1))

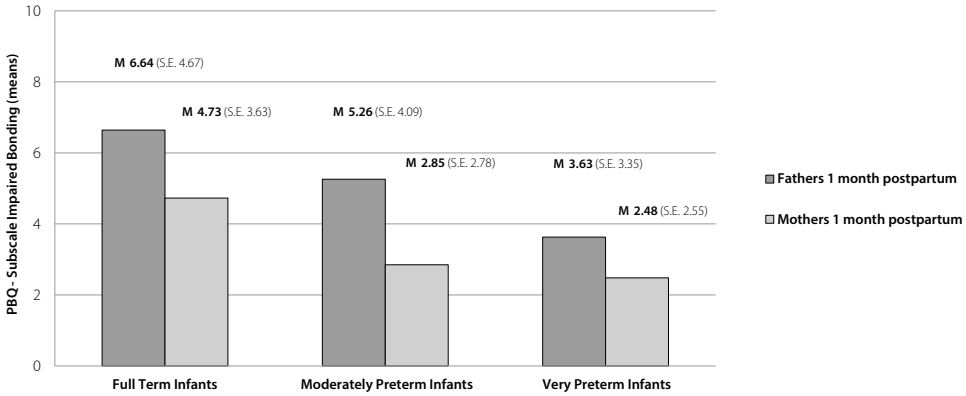
Group	1 Day postpartum		1 Week postpartum		1 Month postpartum	
	CMIN	*P*	CMIN	*P*	CMIN	*P*
Full terms	2.16	.141	8.45	.004	6.85	.009
Moderately preterms	2.93	.087	14.62	<.001	12.65	<.001
Very preterms	3.96	.047	0.69	.408	4.72	.030

Data on mothers' and fathers' PBQ Impaired Bonding scores

To determine the convergent validity between PRAM-SBD and PBQ Impaired Bonding subscale scores, Pearson product-moment correlations were computed. The two measures were positively correlated in both mothers [$r(174) = .31$, $p < .001$], and fathers [$r(164) = .42$, $p < .001$]. The strength of the association between the PRAM and PBQ subscale Impaired Bonding is moderate, but the correlation coefficient is highly significant.

Figures 2.3 displays, respectively, mothers' and fathers' PBQ Impaired Bonding subscale scores 1 month postpartum, for full-term, moderately premature and very premature infants. One-way ANOVAs revealed significant differences at the $p < .05$ level in parental bonding between the three groups under study, for both mothers [$F(2, 174) = 9.43$, $p < .001$], and fathers [$F(2, 161) = 7.24$, $p = .001$]. Post hoc comparisons using the Bonferroni correction revealed that mothers of moderately premature ($p = .002$) and very premature ($p < .001$) infants on average reported less bonding problems with their infant, compared with mothers of full-term infants. In fathers, only a difference between the full-term and very preterm group was observed, with fathers of very preterm infants reporting less bonding problems than fathers of full-term infants ($p = .001$).

Figure 2.3 Mean scores of the Postpartum Bonding Questionnaire (PBQ), for the subscale Impaired Bonding; assessed 1 month postpartum in mothers ($N = 177$) of full-term ($n = 64$), moderately preterm ($n = 61$) and very preterm infants ($n = 52$); and in fathers ($N = 164$) of full-term ($n = 61$), moderately preterm ($n = 54$) and very preterm infants ($n = 49$)



Note: higher scores reflect more bonding problems (impaired bonding).

DISCUSSION

The aims of the present study were twofold: (1) to examine feelings of bonding in a sample of parents of full-term, moderately premature, and very premature infants on three occasions after birth, and (2) to assess differences in bonding representations between mothers and fathers of full-term and preterm infants in the postnatal period.

It was found that 1 day postpartum, the three groups under study did not differ from each other on PRAM-SBD scores, reflecting their degree of parental bonding. In the case of full-term infants, there were no clear variations in the scores of either fathers or mothers during the neonatal period. However, after moderately preterm delivery, PRAM-SBD scores in mothers decreased during the first month postpartum, whereas after very preterm delivery, decreases in PRAM-SBD occurred in both mothers and fathers. Since lower PRAM-SBD scores represent stronger feelings of parent-infant connectedness (Van Bakel et al., 2009), these findings suggest a higher degree of parent-infant bonding after premature childbirth. Moreover, the bonding measure PBQ (i.e. the subscale Impaired Bonding) revealed similar results. Results of the PBQ analysis were thus in line with PRAM findings 1 month postpartum, as mothers of moderately preterm infants and mothers of very preterm infants, as well as fathers of very preterm infants, on average reported less bonding problems compared to parents of full-term infants.

Findings of previous studies concerning parental bonding and investment were contradictory and inconclusive concerning the impact of preterm birth on the parent-infant relationship. It has been reported in some studies that, despite the initial roller coaster

of negative emotions, most parents are immediately involved with and committed to their preterm infant, whereas other studies demonstrated that parents experience persistent difficulties in bonding with their premature newborn (Goldberg and DiVitto, 2002; Muller-Nix and Ansermet, 2009). From evolutionary theory it can be derived that the most important factor influencing parental investment in a premature infant is parents' access to care giving resources (Mann, 1992; Bugental et al., 2012). The results of our study seem to support the notion that in affluent countries with adequate resources, parental bonding and investment in preterm infants, on average, may be higher than in full-term infants.

A possible explanation for the above-mentioned findings is offered by the theory of compensatory care (Beckwith and Cohen, 1978). This theory predicts that there is increased parental care giving behavior to sick and high-risk infants in order to attenuate the effects of hazardous events. Some studies have already reported that prematurity actually may stimulate more parental care and investment instead of disinterest and non-attachment (Beckwith and Cohen, 1978; Wright and Zucker, 1980). Therefore, increased nurturing and caring behavior has been proposed as a compensatory homeostatic mechanism after premature childbirth (Beckwith and Cohen, 1978). High levels of parental bonding and care after preterm childbirth could be beneficial for the infant, since the quality of the early parent-infant relationship is considered to be an important mediating factor between the infant's perinatal risk status and developmental outcome (Forcada-Guex et al., 2006; Singer et al., 2003). Alternatively, compensatory care for preterm infants could also result from cognitive dissonance in parents (Festinger, 1957). As it is psychologically uncomfortable to hold conflicting cognitions, it could be argued that parents may feel a closer bond just because they invested so much (in terms of time, money and energy) in their preterm hospitalized infant.

Our findings could also be the consequence of other psychological processes underlying the bond formation between parents and their premature infant. For instance, premature childbirth can be a very stressful, emotionally demanding and traumatic event for parents, inducing feelings of anxiety, helplessness, depression, and anger (Muller-Nix and Ansermet, 2009). These emotions, as painful as they may be, are important to help parents find some meaning in the situation, and to become aware of their own new parenthood with the reality of having a premature infant (Pancer, Pratt, Hunsberger, and Gallant, 2000). Borghini et al. (2006) showed that parents of high-risk premature infants, who were emotionally affected, anxious and worried during their infant's hospitalization, in particular developed a strong bond with their infant at 6 and 18 month follow-up assessments, whereas withdrawal of parental emotions led to difficulties in establishing a close parent-infant relationship and emotional detachment. These authors argue that parental emotional arousal during hospital stay may facilitate parental involvement, even though the risk of developing distorted representations towards their infant is also increased.

Alternatively, it could be speculated that the decrease in PRAM-SBD scores during the first month postpartum reflects a more stimulating parenting style that is often observed in parents of premature infants (Feldman and Eidelman, 2007; Muller-Nix and Ansermet, 2009; Muller-Nix et al., 2004). Since premature infants typically are less alert, less active and less responsive than full-terms in the first months after birth, their mothers may tend to engage in more active mothering as a result (Muller-Nix and Ansermet, 2009). Small PRAM-SBD scores, with minimal distance between the "self-circle" and the "baby-circle," could reflect this stimulating, controlling, or even intrusive parenting after premature childbirth.

PRAM-SBD scores could also theoretically relate to the underlying principle of the original instrument PRISM (Buchi et al., 1998), in which distance-scores indicate the perceived burden, degree of suffering, and impact of an illness on a person. PRISM distance-measure symbolizes a person's perception of the intrusiveness, unpredictability and controllability of the illness or its symptoms, as well as potential interference with important aspects of daily life (Buchi et al., 1998; Buchi et al., 2002), an adequate description of the way parents can experience an infant's preterm birth and consequent period of hospitalization. In addition, parallels can be drawn between the PRAM and an adapted version of PRISM used by Büchi et al. (2009) in a study about long-term grief experience among couples to assess parental suffering due to loss of their premature baby.

The secondary aim of the study was to examine differences in bonding between mothers and fathers in the three groups under study. It was anticipated that fathers of preterm infants would show relatively high levels of bonding. One day postpartum, similar levels of bonding were observed for mothers and fathers of full-term and moderately preterm infants. However, 1 week and 1 month postpartum, lower PRAM-SBD-scores were found for the mothers compared to fathers in these groups, suggesting a higher degree of bonding in mothers during the first weeks after childbirth. These gender differences on PRAM-SBD were previously reported by Van Bakel et al. (2009) in a prenatal study. In contrast, in the very premature group, differences in bonding between mothers and fathers were extremely small, and not existing even at 1 week postpartum. This finding corroborates previous studies which demonstrated that fathers of high-risk preterm infants in the first months postpartum were more involved with their infant in comparison with fathers of full-terms (Brown et al., 1991; Harrison, 1990). Enhanced paternal bonding after preterm childbirth could be explained by the fact that fathers of premature infants have a unique and demanding supporting role during hospitalization of the infant. In addition, nursing of the infant in an incubator can be done by either the mother or father.

A limitation of the present study is the self-report basis of the measurement instruments, especially concerning the PBQ, in which the possibility of a social desirability bias is present. In the case that parents would experience difficulties with their infant, anxiety about social youth services might lead them to under-report bonding-problems. Furthermore, the

fact that there is no "golden standard" to measure the complex and multifaceted concept of parental bonding might be considered a drawback. To overcome this limitation we included two different bonding instruments in our study, the PRAM and the PBQ, with both measures yielding comparable results. However, the question remains if these outcomes solely represent the strength of the bond between parent and infant, or if they also reflect alternative constructs, such as parental emotional arousal, the intrusiveness of the premature infant in daily life, or even suffering in parents of premature infants. Possibly the bonding measures are sensitive to a combination of these concepts in our study population. In addition, low PRAM-SBD scores could represent the desire of parents to be close to their infant, particularly in the stressful situation of hospitalization when they cannot physically be present all the time. Maybe a parent's suffering and emotional arousal are directly proportional to the strength of the parent-infant attachment relation, in a similar way as sadness and love are mutually connected. Moreover, it is possible that for parents of hospitalized premature infants it is necessary to be totally preoccupied and involved with their infant in order to protect and sooth their child, provide compensatory care, think about his or her future, and in that way establishing a close relationship with their infant. Hence in parents of premature infants, (temporarily) reduced PRAM-SBD scores, representing a higher degree of parent-infant bonding, could reflect this attempt to attenuate the adverse effects of premature childbirth and promote the development of an affectionate parent-infant bond.

To summarize, this study provides some first insights into the process of bonding development in mothers and fathers of full-term and preterm infants. Specific characteristic patterns were found for both parents, dependent on the status of the baby. Results seems to support the notion that bonding is not a fixed given, but rather a process with its own dynamics, which seems to be influenced by child characteristics after the first exposure. Our findings strongly challenge the view that prematurity may inhibit the normal bonding process. It certainly seems to affect this process, but rather than impeding or inhibiting it, bonding seems to be stimulated, at least in an affluent country such as the Netherlands. However, broad generalizations from this Dutch sample cannot be made, as parental bonding and subsequent investment are very much dependent on circumstances and resources. Future studies with different populations, as well as later follow-up measurements, are needed to clarify the development and process of parent-infant bonding after premature childbirth.

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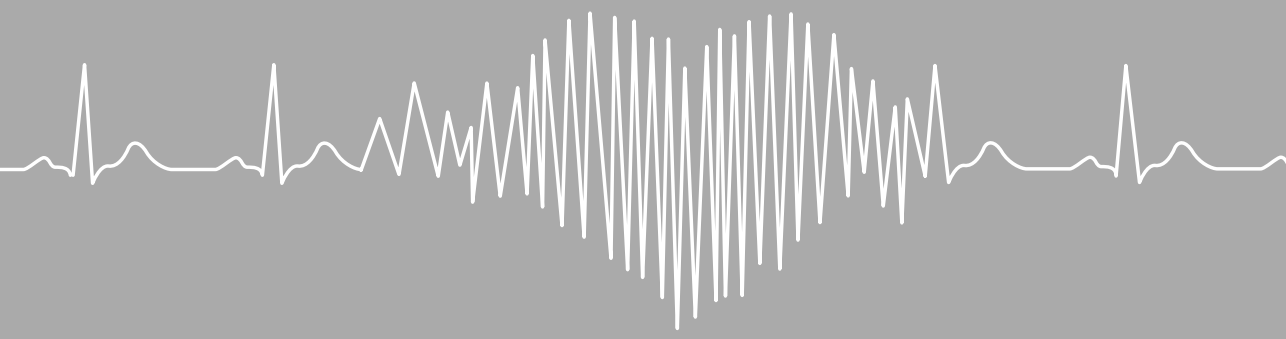
CHAPTER 3

Parenting in complex conditions: Does preterm birth provide a context for the development of less optimal parental behavior?



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ABSTRACT

Objective. The objective of the study was to examine the predictive value of parent, infant, and contextual factors related to preterm childbirth for later parenting behaviors.

Method. Mothers (N = 217) and fathers (N = 204) of term, moderately, and very preterm infants were interviewed one month postpartum using the Clinical Interview for Parents of High-Risk infants (CLIP), to assess their experiences and perceptions related to the pregnancy, delivery, infant, hospitalization, support system, and their narratives. Their responses were factor analyzed and entered into prediction models of parental behaviors (NICHD-observations) at six months postpartum.

Results. Preterm birth was associated with negative experiences and concerns in parents. Regression analyses revealed, however, that irrespective of preterm birth, negative and unrealistic parental perceptions predicted less sensitive, more intrusive, and more withdrawn behavior.

Conclusions. Not prematurity per se, but particularly the presence of negative perceptions in parents, is predictive of difficulties in parent-infant interaction. The CLIP is a potentially useful instrument to identify families at risk.

INTRODUCTION

Prematurity is recognized as a challenging complication of birth that can have a profound effect on parents (Davis, Edwards, Mohay, & Wollin, 2003; Müller-Nix, & Ansermet, 2009). Adverse birth conditions, such as an unexpected early delivery, the hospitalization of the infant, the infant's distinctive pattern of behavior, and uncertainty about the infant's survival and future development, can all put significant stress on families (Goldberg & Di Vitto, 2002). It has been suggested that these contextual and infant characteristics - that are related to the event of preterm birth - negatively affect parents' transitions to parenthood and their behavior toward the infant (Feldman et al., 1999; Goldberg & Di Vitto, 2002). This may be worrisome as the quality of parenting behavior is of great importance for the developmental outcome of any infant and in particular, for the outcome of highly vulnerable infants, such as those born prematurely.

A substantial body of research has already demonstrated that parenting behaviors play a crucial role in the successful development and well-being of an infant. Sensitive, responsive, and contingent good-quality parent-infant interactions have been found to foster optimal infant development, whereas disengaged patterns and intrusive interactions have been linked to a variety of negative developmental outcomes (Easterbrooks, Bureau, & Lyons-Ruth, 2012; Müller-Nix, & Ansermet, 2009; Ramchandani, et al., 2013). Moreover, the impact of parenting appears to be even stronger for developmentally vulnerable infants, as the quality of parent-infant interaction has been identified as an important mediating factor between the infant's perinatal risk status and later competencies and developmental outcome (Forcada-Guex, Pierehumbert, Borghini, Moessinger, & Muller-Nix, 2006; Poehlmann & Fiese, 2001; Smith, Landry, & Swank, 2006).

Given the fact that prematurely born infants represent a large group at risk for developmental disabilities and incidence rates of preterm birth continue to rise around the world (March of Dimes, PMNCH, Save the Children, & WHO, 2012), there is growing concern for the quality of early parent-preterm infant interactions (Coppola, Cassibba, & Costantini, 2007; Singer, Fulton, Davillier, Koshy, Salvator, & Baley, 2003). Findings from previous studies on the quality of mothers' interactional behavior after preterm birth have been inconclusive and seemingly contradictory (Bozzette, 2007; Korja et al., 2012). Mothers of infants born prematurely have been described by some researchers as less sensitive, more intrusive, and, at the same time, as more disengaged than mothers of healthy and full-term infants (Müller-Nix & Ansermet, 2009). Unfortunately, the underlying causes of these adverse parental behaviors remained unclear. Conversely, other researchers characterized mothers of preterm infants as relatively competent in their interaction (Muller-Nix & Ansermet, 2009). A recent literature review by Korja et al. (2012) revealed that five out of eighteen studies reported an equal or even higher quality of mother-infant interaction in preterm dyads, compared with full-term dyads. These contrasting findings emphasize the complexity of

the early parent-infant relationship, as well as the need for further investigation of parental experiences and perceptions that affect parenting of infants born preterm.

In our previous study on parental experiences and perceptions of preterm birth related stressors (covering themes such as the course of pregnancy, the infant's medical condition, and the hospital environment) we already demonstrated that the lower the gestational age (GA) of the infant, the more negative maternal and paternal experiences and perceptions are in the postpartum period (Tooten et al., 2013). Moreover, earlier studies by Keren et al. (2003) and Latva et al. (2008) showed that these negative postpartum experiences and perceptions in mothers are associated with the development of non-optimal mother-infant interactions, as well as behavioral and emotional problems in infants. It remained, however, unclear which specific factors and stressors, that is, parent, infant, or contextual, were most predictive. Also, these studies failed to include fathers, and sample sizes were relatively small. From a preventive perspective, the identification of potentially modifiable factors is of major interest, particularly because demographic and biological risk factors for adverse parenting, such as socioeconomic status and prematurity, are difficult to change.

The purpose of the present study was to investigate which parent characteristics (e.g., demographics, emotions, and perceptions), infant characteristics (e.g., prematurity and health status), and contextual factors (e.g., hospital environment) related to preterm birth interfere with the quality of later parenting behaviors. Parents' experiences and perceptions of birth-related stressors were therefore evaluated after term and preterm delivery. Parents of moderately preterm as well as very preterm infants were included, as both populations account for a substantial proportion of hospital admissions, and both are at increased risk of neonatal morbidity (Engle, Tomashek, & Wallman, 2007). Nevertheless, a distinction between these groups was made, as infants born very preterm are at higher medical risk and require more intensive treatment than those born moderately preterm. Because little is known about the role of fathers, both mothers and fathers were included in the sample.

In short, although several studies have addressed risk factors for non-optimal parent-infant interaction, uncertainty still exists as to whether difficult conditions surrounding the event of preterm birth impact on later parenting behaviors. The present study examined whether the challenging event of preterm birth provides a context for the development of less optimal parental interactive behavior. To examine the relation between preterm birth stressors and parenting practices, the following research objectives were set: (1) to identify the main dimensions underlying parents' experiences and perceptions of birth stressors; (2) to evaluate the differences in experiences and perceptions of birth stressors, and subsequent interactive behavior among mothers and fathers of term and preterm infants; and (3) to examine the relation between parental experiences and perceptions of birth stressors and the quality of parents' subsequent interactive behavior toward the infant. Given the results of previous studies on preterm birth-related stressors, we hypothesized

that negative experiences, negative perceptions, and concerns among parents of term and preterm infants at one month postpartum would predict less sensitive, more intrusive, and more withdrawn parental interactive behavior at six months postpartum.

METHOD

Participants and recruitment

This study is part of a larger longitudinal study among parents with term and preterm infants (Tooten et al., 2012). The study protocol received ethical approval by the Medical Ethical Committee of the Catharina Hospital in Eindhoven, The Netherlands. In addition, local feasibility approval was obtained from all participating hospitals.

Parents were eligible for study participation if they had a term or preterm hospital delivery. Both mothers (n = 217) and fathers (n = 204) of term (n = 76), moderately preterm (n = 70), and very preterm (n = 72) infants were recruited from eight hospitals in The Netherlands. Parents of term infants (i.e., the T-group; ≥ 37 weeks GA) and of moderately preterm infants (i.e., the MP-group; ≥ 32 - 37 weeks GA) were recruited from eight maternity wards, while parents of very preterm infants (i.e., the VP-group; < 32 weeks GA) were recruited from two Neonatal Intensive Care Units (NICU). Parents with poor understanding of the Dutch language were excluded from participation. The exact number of eligible families and participation refusals was not determined owing to practical reasons, yet the main reasons for nonparticipation were registered during a limited time frame. The most cited reasons for refusal to participate in the study were lack of time or lack of interest.

All parents were invited personally by nurses from the participating hospitals before the delivery or within 24 hr after birth. The nurses informed parents about the design and aims of the study, while providing them with a written information brochure. In addition, parents were told that participation was voluntary, without any financial compensation, and that they were free to withdraw from the study at any time. Written informed consent was obtained from all participating parents. Background information of the study participants is presented in the results section.

Measures

Interview measures of parental experiences and perceptions

To assess systematically parental negative experiences and perceptions of term and preterm birth-related stressors, all parents were interviewed at one month postpartum using the semi-structured Clinical Interview for Parents of High-Risk Infants (CLIP; Keren et al., 2003; Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993). The CLIP was originally developed as a clinical tool for NICU social workers and nurses. The instrument was designed to assess

parents' negative experiences and perceptions after birth of a high-risk infant, and is believed to be potentially useful for assessment of family strength, early parental adaptation, coping strategies, and areas of concern, and for the identification of parents in psychological need. The interview "enables the clinician to ascertain how the parents perceive, feel about, and understand their current situation" (Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993). Consequently, the interview provides a multidimensional profile of parents' current cognitions, experiences, emotions, and perceptions of (preterm) birth-related stressors. The interview was used to obtain in-depth and comprehensive information from parents about the infant's medical condition (CLIP area 1), the course of the pregnancy (CLIP area 2), parents' experience of the labor and delivery (CLIP area 3), their relationship with the infant and feelings as a parent (CLIP area 4), parents' reactions to hospital and staff (CLIP area 5), parents' support system (CLIP area 6), and the infant's hospital discharge (CLIP area 7). In addition, the quality of parents' narratives during the interview was evaluated by means of three global rating scales (CLIP area 8).

The individual face-to-face interviews were conducted by one of the researchers (H.H., R.H., or A.T.) who are trained interviewers, and lasted approximately 45 min per person. Parents were interviewed separately, in a private setting at the hospital, or at the participant's home. Questions were asked according to the interview manual and a general prompt was offered when parents did not fully answer the question (e.g. "Could you please tell me more about…?"). Parents' narratives were videotaped and subsequently analyzed by means of a coding scheme developed by Keren et al. (2003), which provides guidelines on how to code parents' responses. Similar to previous studies using the CLIP, the qualitative dimensions of the interview were analyzed and rated in a quantitative approach (Keren et al., 2003; Latva et al., 2008) by one of the researchers (H.H., R.H., or A.T.). To make the instrument applicable to our study sample of mothers and fathers, of term as well as preterm infants, minor adaptations were made to the original interview items and corresponding coding scheme. The CLIP coding manual consisted of 27 CLIP items, comprising 24 interview questions and 3 global items (see Appendix 3.A). Higher scores on the interview questions indicated more negative experiences, negative perceptions, and areas of concern as identified by the parent. The rating of CLIP item 24 "expectations for the infant's future" (a question that focuses on parents' impressions regarding their infant's future development) was based on parents' interview responses as well as the infant's medical data. For instance, when a parent of a very preterm infant expected that the infant's behavior immediately would approximate that of a healthy term infant, this was classified as holding "partially appropriate" or "discrepant" expectations. It is important that parents hold age-appropriate expectations for their infant's behavior because mismatches between parental expectations and infant capacities may lead to frustration or feelings of inadequacy in parents (Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993).

To evaluate the inter-rater reliability of the instrument, 30 interviews (16 from mothers and 14 from fathers) were randomly selected and double-coded. Mothers' and fathers' intraclass correlation coefficients (ICC) for inter-rater agreement were .93 and .88 for CLIP area 1, .97 and .99 for CLIP area 2, .92 and .97 for CLIP area 3, .97 and .91 for CLIP area 4, .95 and .92 for CLIP area 5, .83 and .88 for CLIP area 6, .87 and .76 for CLIP area 7, and .86 and .83 for CLIP area 8, respectively.

Observational measures of parental interactive behavior

To evaluate maternal and paternal behavior at six months postpartum, the parent-infant dyads were videotaped during a home visit. Parents were provided with a standard set of toys and were asked to play with their child freely and as they normally would do for 15 min. The recorded observations of mother-infant and father-infant interactions were rated by independent coders using the National Institute of Child Health and Human Development (NICHD) coding scheme developed by the U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Child Health and Human Development Early Care Research Network (NICHD, 1999; Ravn et al., 2011). Manualized decision rules were used to categorize and quantify the verbal and nonverbal interactive behaviors of mothers and fathers, considering both the quality and the quantity of the behaviors. The ratings were assigned on six global rating items on a 4-point scale, ranging from (1) very uncharacteristic to (4) very characteristic parental behaviors. The items were subsequently clustered into three composite scores, that is, sensitivity, intrusiveness, and withdrawal, on a 7-point scale. The minimum score a parent could receive was 2 (1+1), and the maximum score was 8 (4+4). For the reason of clarity, the composites were recoded to range from (1) very uncharacteristic behavior to (7) very characteristic behavior. The items "sensitivity to non-distress" and "positive regard for the infant" were combined to evaluate *sensitivity* in parents. When a parent scores high on sensitivity, this means that the interaction is infant-centered and that the parent is aware of the infant's needs and interests and is responsive to them. The items "intrusiveness" and "negative regard for the infant" were combined into the composite score for parental *intrusiveness*. Parents who score high on this scale impose their own agenda on the infant. Intrusive parents do not allow the infant to influence the pace or focus of play, they often overwhelm the infant with a rapid succession of toys or suggestions, or abruptly discipline the infant. The items "detachment" and "flatness of affect" were combined to assess *withdrawal* in parents. Parents with a high score on this scale appear to be emotionally uninvolved and do not provide the support that enables the infant to expand activities.

The videotapes were scored according to the NICHD coding manual by independent coders (two graduate students in psychology) who were blind to the participants' previous scores on the CLIP. Before scoring, the coders received standardized training for reliability,

along with regularly scheduled supervision during the process of coding. To evaluate the inter-rater reliability of the instrument, 30 videos (16 from mother-infant and 14 from father-infant interaction) were randomly selected and double-coded. Mothers' and fathers' ICC values for inter-rater agreement were .90 and .72 for sensitivity, .93 and .72 for intrusiveness, and .87 and .84 for withdrawal, respectively.

Data analyses

To examine the predictive value of parent, infant, and contextual factors related to term and preterm birth for later parental interactive behavior, parents' interview responses at one month postpartum were factor analyzed and subsequently entered into prediction models of parental sensitivity, intrusiveness, and withdrawal at six month postpartum. The analytical goals of the study were threefold: (1) to determine the factor structure of the CLIP using both exploratory and confirmatory analytic methods; (2) to evaluate the differences between parents of term, moderately preterm, and very preterm infants on the identified CLIP factors at one month postpartum, and on parental interactive behavior at six month postpartum; and (3) to examine the relation between parental experiences and perceptions of preterm birth-related stressors at one month postpartum (CLIP factors), and the quality of parents' interactive behavior toward the infant (i.e., sensitivity, intrusiveness, and withdrawal) at six months postpartum.

Parents' interview and observational data were thus analyzed in four consecutive stages: (1) an exploratory factor analysis (EFA) on the CLIP, (2) a confirmatory factor analysis (CFA) on the CLIP, (3) one-way between-groups analyses of variance (ANOVAs) on the CLIP factors and the NICHD scores of parental behavior, and (4) hierarchical multiple regression analyses to examine the relation between the CLIP factors and the five months later obtained NICHD scores of parental behavior. Before the analyses, the sociodemographic and clinical characteristics of the study groups were compared at baseline using chi-square analyses for categorical variables and ANOVAs for continuous variables. In case of twins (n= 27), only data concerning the first-born infant were included in the analyses. The method of expectation maximization was used to account for missing data, under the missing at random assumption.

Exploratory factor analysis CLIP interview

First, the factor structure of the CLIP was examined using an EFA to gain understanding about the number and nature of the themes underlying mothers' interview data. To reveal these underlying dimensions reflected in mothers' narratives (Appendix 3.A), mothers' interview items were subjected to an EFA using SPSS 17.0. Because there was limited a priori knowledge of the conceptual grouping of CLIP items in our study population, the EFA was conducted with only mothers' interview items to generate theory. Father's CLIP items were not included in the EFA to avoid biases due to the dyadic nature of the data.

Confirmatory factor analysis CLIP interview

To shed light on the relations among mothers' and fathers' experiences and perceptions of birth-related stressors, the CLIP items of both parents were subjected to a CFA using the factor structure derived from the EFA. The CFA was conducted by means of structural equation modeling in the statistical software R (http://www.r-project.org). As parents are not independent from each other, the interview items of mothers and fathers were subjected to the CFA simultaneously to account for the dyadic dependence structure of the data. By treating the family as the unit of analysis, the factors as well as the item residuals were allowed to inter-correlate between fathers and mothers so comparisons could be made.

Group comparisons on parents' CLIP factors and interactive behavior

Composite scores were created for the obtained CLIP factors. These CLIP factor sum scores were subsequently subjected to ANOVAs with a priori contrasts using the Bonferroni correction, to examine differences in parental experiences and perception at one month postpartum between the groups under study, that is, the T-group, MP-group, and VP-group. In addition, the group differences on parental behavior at six months postpartum were examined by conducting ANOVAs on the NICHD scores of parental sensitivity, intrusiveness, and withdrawal.

Predictive validity of CLIP factors on parental interactive behavior

A series of hierarchical multiple regression analyses were conducted to determine whether the CLIP factors assessed at one month postpartum were predictive of parental interactional behavior at six months postpartum. The analyses were performed on the NICHD composite scores of parental "sensitivity", "intrusiveness" and "withdrawal" as dependent variables. The mother-infant and father-infant data were analyzed separately. The predictor variables were entered in four theoretically determined consecutive steps. First, to account for the effects of potentially important covariates, parents' formal educational level and previous experience in parenting (first-time parents vs. experienced parents) were entered in the first step. In the second step, the degree of the infant's prematurity (MP-group and VP-group vs. T-group) was added to the model, to examine the association between the infant's biological age and later parental behavior. Third, the four CLIP factor sum scores were included in the regression model to assess the unique contribution of the four CLIP factors, measuring parental experiences and perceptions, in the explanation of parental interactive behavior at six months postpartum. Finally, additional analyses of interaction were performed with cross-product terms to check for interactions between the CLIP factors and the study groups. The relative contribution of the predictors to the final model was determined based on the increment in explained variance provided by each step.

RESULTS

Background characteristics

Baseline demographic and clinical characteristics of the study participants are presented in Table 3.1. Preterm infants had significantly lower GA ($F(2,214) = 795.58$, $p<.001$), lower birth weights ($F(2,214) = 359.76$, $p<.001$), lower 5-minute APGAR scores ($F(2,208) = 47.84$, $p<.001$), more days spent in an incubator ($F(2,210) = 163.59$, $p<.001$), longer hospital stays ($F(2,209) = 232.35$, $p<.001$), and higher mortality rates (χ^2 (2, n = 218)= 6.17, $p<.05$), compared with term infants. Also, significantly more preterm infants were part of a twin pair (χ^2 (2, n = 218) = 7.66, $p<.05$). With respect to parents' demographics, preliminary analyses did not reveal significant differences among the three study groups on nationality and marital status. Yet, mothers of preterm infants were on average lower educated ($F(2,211) = 7.13$, $p<.01$) than mothers of term infants. Also, mothers ($\chi2$ (2, n = 217) = 13.73, $p<.01$) and fathers ($\chi2$ (2, n = 204) = 8.82, $p<.05$) of preterm infants were more often first-time parents, compared with parents of term infants. Slightly more mothers than fathers participated in the study, as eight mothers were living without a partner. Also, six fathers and one mother were not in a position to give an interview owing to practical reasons. The proportion of families lost to follow-up at six months postpartum was approximately 10%, with comparable drop-out rates for the three groups under study.

Exploratory factor analysis CLIP interview

All 27 items of the CLIP were subjected to an EFA to identify a viable factor structure in mothers' interview data. First, factorability of the data was examined by means of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, Bartlett's test of sphericity, and the correlation matrix. With 217 participating mothers and 27 variables, the subject to item ratio was 8:1. The KMO estimate was .771 and Bartlett's test reached significance ($\chi^2(153) = 1091.68$, $p < .001$). Data from mothers of term and preterm infants were analyzed concurrently, as similar patterns of correlation between interview items were observed for the study groups (i.e., the T-group, MP-group, and VP-group).

The decision on the number of factors to extract was based upon Horn's Parallel Analysis (PA) with Glorfeld's modification, one of the most accurate strategies for factor retention decisions (Glorfeld, 1995; Henson & Roberts, 2006; Horn, 1965). In PA, those factors are retained that account for more variance than parallel factors derived from random data. The analysis indicated that a four-factor model provided the best fit to the data. Principal axis factoring with the direct oblimin rotation method was used for factor extraction, as we expected factors to be correlated. Three items were reverse-coded (see Appendix 3.A), so that all factor scores reflected more negative experiences or perceptions. After rotation, both the factor structure and factor pattern matrices were assessed. Items with factor loadings ≥

.30 were considered to be significant contributors to a factor. A minimum of at least three indicators per factor was regarded meaningful. Five items with low factor loadings (< .30) and four freestanding items (failing to load significantly on any factor) were eliminated (Costello & Osborne, 2005). The analysis yielded an 18-item model with a four-factor solution, indicating that four different factors were underlying mothers' interview responses. Table 3.2 displays the final pattern matrix for the rotated factor loadings of mothers' CLIP items.

Table 3.1 Infant birth data and parental demographic characteristics of study participants

	T-Group	MP-Group	VP-Group	Total	Difference
Infant medical data, *n*	**76**	**70**	**72**	**218**	**-**
Male sex, %	47.4	57.1	51.4	51.8	ns
Twins, %	3.9	17.1	16.7	12.4	a,b
GA at birth, *weeks*	39.5 (1.4)	34.6 (1.3)	29.4 (1.9)	34.6 (4.4)	a,b,c
GA at birth, *range*	37 - 42	32 - 37	25 - 32	25 - 42	-
Birth weight, *grams*	3441 (497)	2332 (562)	1285 (388)	2368 (1013)	a,b,c
Birth weight, *range*	2030 - 4865	1220 - 4280	556 - 2220	556 - 4865	-
5-min APGAR	9.7 (0.7)	9.2 (1.2)	7.8 (1.6)	8.9 (1.4)	b,c
Incubator stay, *days*	0.2 (1.2)	7.5 (8.7)	39.0 (22.1)	15.1 (21.5)	a,b,c
Hospital stay, *days*	2.7 (2.3)	18.1 (11.0)	62.7 (28.0)	26.8 (30.4)	a,b,c
Hospital stay, *range*	0 - 14	3 - 47	27 - 166	0 - 166	-
Mortality, *n*	0	0	3	3	ns
Single/divorced parents, %	2.6	1.4	6.9	3.7	ns
Maternal demographic data, *n*	**76**	**70**	**71**	**217**	**-**
Nationality Dutch, %	92.1	95.7	91.5	93.0	ns
Educational level †	2.6 (0.7)	2.2 (0.7)	2.2 (0.7)	2.3 (0.7)	a,b
First time parent, %	50.0	71.4	77.5	65.9	a,b
Paternal demographic data, *n*	**73**	**66**	**65**	**204**	**-**
Nationality Dutch, %	97.3	93.9	92.3	94.6	ns
Educational level †	2.4 (0.8)	2.3 (0.8)	2.1 (0.8)	2.3 (0.8)	ns
First time parent, %	50.7	68.2	73.8	63.7	a,b

Values are expressed as means (SD) unless otherwise indicated.
T = term infants, MP = moderately premature infants, VP = very premature infants.
† = Educational level was classified as a low level (1) corresponding with primary education, a medium level (2) corresponding with junior vocational training, and a high level (3) corresponding with senior vocational or academic training.
ns = Non-significant
a = T-Group differed from MP-Group, p<.05
b = T-Group differed from VP-Group, p<.05
c = MP-Group differed from VP-Group, p<.05

Table 3.2 Exploratory Factor Analysis (EFA): Pattern matrix for the rotated factor loadings of mothers' CLIP interview items

Original CLIP Interview Item	CLIP Factor				
	F1	F2	F3	F4	
	Difficulty Bonding	Concerns Infant	Discontent Hospital	Negative Perceptions	R^2
11. Delayed bonding with the infant	**.740**	.110	–.020	.034	.635
06. Delayed timing of pregnancy feeling real	**.596**	–.160	–.039	–.076	.314
10. Negative first feelings towards infant	**.577**	.128	–.078	–.010	.416
12. Negative present feelings towards infant	**.504**	.126	.091	.317	.513
13. No feeling of mutual recognition	**.422**	.129	.094	.085	.249
01. Poor health status infant	–.058	**.885**	–.076	–.153	.752
02. Fear of losing infant	–.001	**.785**	.038	–.058	.603
23. Concerns about future development infant	.095	**.500**	–.033	.105	.327
08. Not ready for delivery	.054	**.399**	–.085	.179	.254
16. Lack of confidence in hospital staff	.087	.042	**.758**	–.088	.565
17. Lack of confidence in hospital environment	–.047	–.086	**.757**	–.041	.622
18. Bothered by lack of control in hospital	–.167	–.222	**.495**	.096	.378
24. Unrealistic expectations for infant's future	–.008	.068	.056	**.684**	.477
26. Poor organized narrative	.110	.039	–.083	**.638**	.505
22. Lack of social support	–.049	–.047	–.250	**.466**	.281
20. Lack of support spouse	.104	–.104	–.114	**.377**	.200
27. Poor richness of content narrative	–.029	.065	.191	**.368**	.161
03. Negative first reaction to pregnancy	.248	–.027	–.046	**.314**	.221
Inter–factor correlations					
F1 Difficulty Bonding	1				
F2 Concerns Infant	.287	1			
F3 Discontent Hospital	–.241	–.066	1		
F4 Negative Perceptions	.359	.161	–.112	1	

Loadings on the four CLIP factors are bolded for readability.
Item 12 was assigned to the dominant factor.

Factors were labeled according to the content of the items and coefficient patterns. The first factor (CLIP F1), referred to as *difficulty with bonding*, represents a delayed or impaired process of developing an affectionate parent-infant relationship. The second factor (CLIP F2), referred to as *concerns about infant*, reflects the worries that parents have about the current

health status and future development of their infant. The third factor (CLIP F3), referred to as *discontent about hospital*, reflects parents' dissatisfaction with respect to the hospital care, staff, and equipment. The fourth factor (CLIP F4), referred to as *negative perceptions*, captures the presence of negative and/or unrealistic perceptions in parents regarding their infant's future development and their social support network, as well as features of disorganization in their narratives.

Confirmatory factor analysis CLIP interview

The EFA was followed by a CFA treating the family as the unit of analysis, and hence involving both the mother and father data. The CFA model was specified starting from the covariance matrix and fitted using maximum likelihood to make efficient use of all available data. Model fit was evaluated based on commonly recommended goodness-of-fit indices, including the chi-square test of absolute fit (χ^2 (df = 548) = 898.058), the root mean square error of approximation (RMSEA = .054), and the standardized root mean square residual (SRMR = .087). Given the low average correlations in the data, which is explained by the fact that the interview covers a wide range of topics, comparative fit indices with reference to the null model (such as the comparative fit index) were not informative and therefore not used. The dyadic four-factor model provided a good fit to the data, which indicates that the factor structure is valid for both mothers and fathers. The factor loadings of mothers' and fathers' CLIP items and other model parameters are presented in Table 3.3. The inter-factor correlations of the CLIP composites indicate that mothers and fathers share some of their experiences and perceptions of birth stressors. The high inter-factor correlations on CLIP F2 (r = .92) in particular suggest that parents share most of their concerns regarding the health status and development of their newborn.

The lower bound to the reliability of the CLIP factors was estimated using Guttman's lambda-2 (λ_2; Guttman, 1945). Guttman's λ_2 provides a more accurate estimate of the reliability compared with Cronbach's alpha, because the latter assumes essential tau-equivalence of the factor loadings. Violation of the assumptions required by this measurement model can lead to negatively biased reliability estimates for congeneric measures such as the CLIP (Cho & Kim, 2014; Sijtsma, 2009). The CLIP factors demonstrated sufficient internal consistency. Mothers' and fathers' consistency coefficients were λ = .75 and λ = .69 for CLIP F1, λ = .74 and λ = .76 for CLIP F2, λ = .74 and λ = .68 for CLIP F3, and λ = 67 and λ = 65 for CLIP F4, respectively.

Group comparisons on parents' CLIP factors and interactive behavior

One-way ANOVAs were conducted to compare parents in the T-, MP- and VP-group on the identified CLIP factors at one month postpartum, and on the NICHD scores of parental interactive behavior at six months postpartum.

Table 3.3 Confirmatory factor analysis (CFA) model of the CLIP interview for mothers (M) and fathers (F)

		CLIP Factor										
		F1		F2		F3		F4				
		Difficulty Bonding		Concerns Infant		Discontent Hospital		Negative Perceptions		$R(\varepsilon_M, \varepsilon_F)$	R^2	
CLIP Item		**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**		**M**	**F**
11		0.79	0.73	-	-	-	-	-	-	.09*	0.62	0.53
06		0.43	0.33	-	-	-	-	-	-	.23*	0.18	0.11
10		0.64	0.62	-	-	-	-	-	-	.17*	0.41	0.38
12		0.71	0.81	-	-	-	-	-	-	.10*	0.50	0.65
13		0.49	0.23	-	-	-	-	-	-	.14*	0.24	0.05
01		-	-	0.76	0.85	-	-	-	-	.53*	0.58	0.73
02		-	-	0.83	0.78	-	-	-	-	.14*	0.69	0.61
23		-	-	0.56	0.58	-	-	-	-	.32*	0.31	0.34
08		-	-	0.37	0.40	-	-	-	-	.86*	0.14	0.16
16		-	-	-	-	0.66	0.63	-	-	.19*	0.44	0.40
17		-	-	-	-	0.87	0.84	-	-	.40*	0.76	0.71
18		-	-	-	-	0.53	0.43	-	-	.22*	0.28	0.19
24		-	-	-	-	-	-	0.64	0.57	.10*	0.41	0.32
26		-	-	-	-	-	-	0.76	0.58	.01*	0.58	0.34
22		-	-	-	-	-	-	0.39	0.38	.62*	0.15	0.14
20		-	-	-	-	-	-	0.44	0.51	.38*	0.20	0.26
27		-	-	-	-	-	-	0.29	0.48	.17*	0.08	0.23
03		-	-	-	-	-	-	0.45	0.38	.35*	0.20	0.14
Inter-factor Correlations		**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**			
F1	**M**	1										
	F	0.32*	1									
F2	**M**	0.39*	0.37*	1								
	F	0.33*	0.42*	0.92*	1							
F3	**M**	0.32*	0.16	0.16*	0.08	1						
	F	0.04	0.34*	0.14	0.24*	0.45*	1					
F4	**M**	0.57*	0.40*	0.15	0.17	0.26*	0.24*	1				
	F	0.33*	0.70*	0.16	0.06	0.09	0.29*	0.72*	1			

*p<.05
M = Mothers
F = Fathers

CLIP factors by group

Analyses of the CLIP factors revealed significant differences on all CLIP factor sum scores across the three study groups. Regarding the first factor, *difficulty with bonding,* differences could be observed between the T-, MP-, and VP-group, in both mothers ($F(2, 214) = 10.17$, $p < .001$, $\eta^2 = .09$) and fathers ($F(2, 201) = 9.76$, $p < .001$, $\eta^2 = .09$). Results from the a priori contrasts showed that, compared with mothers of term ($p < .001$) and moderately preterm ($p < .01$) infants, mothers of very preterm infants experienced more difficulties in bonding with their infant. Further, fathers of moderately ($p < .05$) as well as very prematurely ($p < .001$) born infants experienced more difficulties in bonding than fathers of term infants. Analyses on the second factor, *concerns about infant,* revealed that both mothers ($F(2, 214) = 171.99$, $p < .001$, $\eta^2 = .62$) and fathers ($F(2, 201) = 165.82$, $p < .001$, $\eta^2 = .62$) of prematurely born infants were considerably more worried about the health status and development of their infant compared with parents of term born infants. Parents of very preterm infants expressed more concerns about their infants than parents of moderately preterm infants ($p < .001$), who in turn were more concerned than parents of term infants ($p < .001$). On the third factor, *discontent about hospital,* only in mothers' responses, small group differences were detected ($F(2, 214) = 3.42$, $p < .05$, $\eta^2 = .03$). Mothers of moderately preterm infants were slightly more discontent with the quality of the hospital care compared with mothers of full-term infants ($p < .05$). Fathers of term and preterm infants did not differ from each other regarding their level of satisfaction with hospital care. With respect to the fourth factor *negative perceptions,* the analyses revealed a difference between study groups, in both mothers ($F(2, 214) = 5.39$, $p < .01$, $\eta^2 = .05$) and fathers ($F(2, 201) = 4.82$, $p < .05$, $\eta^2 = .04$). Parents of very preterm infants held somewhat more negative and unrealistic perceptions in comparison with parents of term infants ($p < .01$). Results are shown in Table 3.4.

Parental behavior by group

The analyses of the NICHD revealed small group differences in paternal *sensitivity* ($F(2, 201) = 3.58$, $p < .05$, $\eta^2 = .03$) and *intrusiveness* ($F(2, 201) = 3.08$, $p < .05$, $\eta^2 = .03$). Results from the a priori contrasts indicated that fathers of preterm infants tended to demonstrate less sensitive and more intrusive behaviors during father-infant interactions than fathers of term infants ($p < .05$). On *withdrawal* behaviors, fathers from term and preterm infants did not differ from each other. Regarding the quality of mother-infant interactional behaviors, no group differences were observed (see table 3.5).

Table 3.4 Group differences (T, MP, and VP) on maternal and paternal experiences and perceptions (CLIP factors) at 1 month postpartum

CLIP Factors †	**T-group** M (SD)	**MP-group** M (SD)	**VP-group** M (SD)	**F**	***p***	**η^2**	**difference**
Mothers							
F1 Difficulty Bonding	8.04 (2.71)	8.19 (2.16)	9.75 (2.63)	10.17	***	.09	b,c
F2 Concerns Infant	4.41 (0.75)	6.37 (1.35)	8.31 (1.60)	171.99	***	.62	a,b,c
F3 Discontent Hospital	4.30 (1.50)	4.96 (1.73)	4.80 (1.54)	3.42	*	.03	a
F4 Negative Perceptions	7.71 (1.85)	8.17 (1.79)	8.85 (2.58)	5.39	**	.05	b
Fathers							
F1 Difficulty Bonding	8.18 (2.02)	9.32 (2.36)	9.97 (2.86)	9.76	***	.09	a,b
F2 Concerns Infant	4.32 (0.60)	6.35 (1.20)	8.12 (1.70)	165.82	***	.62	a,b,c
F3 Discontent Hospital	3.90 (1.19)	4.21 (1.42)	4.14 (1.18)	1.13		.01	ns
F4 Negative Perceptions	8.08 (1.66)	8.42 (2.06)	9.06 (2.21)	4.28	*	.04	b

* p<.05, ** p<.01, *** p<.001
T = term infants, MP = moderately premature infants, VP = very premature infants.
† = higher scores represent more negative experiences and perceptions in parents.
ns = Non-significant
a = T-group differed from MP-group, p<.05
b = T-group differed from VP-group, p<.05
c = MP-group differed from VP-group, p<.05

Table 3.5 Group differences (T, MP, and VP) on maternal and paternal interactive behavior (NICHD scores) at 6 months postpartum

NICHD Composite scores †	**T-group** M (SD)	**MP-group** M (SD)	**VP-group** M (SD)	**F**	***p***	η^2	**difference**
Mothers							
Sensitivity	5.54 (1.37)	5.35 (1.39)	5.39 (1.18)	0.42		.00	ns
Intrusiveness	1.68 (0.97)	2.03 (1.28)	1.91 (1.03)	1.96		.02	ns
Withdrawal	1.67 (1.25)	1.54 (0.90)	1.69 (1.12)	0.36		.00	ns
Fathers							
Sensitivity	5.26 (1.21)	4.79 (1.23)	4.77 (1.24)	3.58	*	.03	a,b
Intrusiveness	1.48 (0.66)	1.84 (1.10)	1.79 (0.95)	3.08	*	.03	a
Withdrawal	1.97 (1.17)	2.15 (1.29)	2.31 (1.33)	1.29		.01	ns

* p<.05, ** p<.01, *** p<.001
T = term infants, MP = moderately premature infants, VP = very premature infants.
† = higher scores represent more of the indicated quality of parental behavior toward the infant, i.e., more sensitive, intrusive or withdrawn behavior.
ns = non-significant
a = T-group differed from MP-group, p<.05
b = T-group differed from VP-group, p<.05

Predictive validity of CLIP factors on parental interactive behavior

Hierarchical multiple regression analyses were conducted to determine if birth-related parental perceptions and experiences at one month postpartum (CLIP factors: F1 difficulty with bonding, F2 concerns about infant, F3 discontent about hospital, and F4 negative perceptions) contributed to the prediction of parental interactive behavior at six months postpartum (NICHD scores: sensitivity, intrusiveness, and withdrawal), beyond that explained by differences in parental educational level, parenting experience, and the level of prematurity. Maternal and paternal behaviors were analyzed separately as dependent variables. As already outlined, in all regression analyses the data were entered in four consecutive steps to identify the unique contribution of each set of variables in predicting later parental behaviors. The interaction terms that were added as a final step to the regression models did not contribute significant incremental variance to the prediction of parents' interactional behavior. Because these more complex models failed to provide better explanatory power, the interaction models were rejected in favor of the simpler models including only the main effects. Table 3.6a and Table 3.6b depict the unstandardized (B) and standardized (β) regression coefficients for the regression models, the change in explained variance (ΔR^2) for each entry, and the total variance accounted for by the full models (R^2).

Predictors of parental sensitivity

The demographic variables entered at step 1 accounted for 15% ($R^2 = .15$, $p < .001$) of the variance in maternal sensitivity, and 6% ($R^2 = .06$, $p < .01$) of the variance in paternal sensitivity. Entry of the infant's prematurity at step 2 did not explain additional variance ($\Delta R^2 = .00$) in mothers, whereas in fathers, it provided a significant 3% increase of explained variance ($\Delta R^2 = .03$, $p < .05$). Adding the CLIP factors to the equation at step 3, explained an additional significant 10% of the variance in maternal sensitivity ($\Delta R^2 = .10$, ΔF (4, 208) = 6.77, $p < .001$) and 19% ($\Delta R^2 = .19$, ΔF (4, 195) = 12.86, $p < .001$) of the variance in paternal sensitivity, beyond the variability contributed by the variables entered in the previous two steps. Addition of the interaction terms did not add significant variance to the model of maternal ($\Delta R^2 = .02$, ΔF (8, 200) = .78, *ns*) or paternal ($\Delta R^2 = .01$, ΔF (8, 187) = .29, *ns*) sensitivity. The final model significantly predicted the quality of sensitive behaviors in parents, explaining 25% of the variance in mothers ($R^2 = .25$, F (8, 208) = 8.57, $p < .001$) and 28% in fathers ($R^2 = .28$, F (8, 195) = 9.55, $p < .001$). Educational level was found to only predict mothers' sensitivity outcomes, with more highly educated mothers showing more sensitive behaviors toward their infant ($\beta = .31$, $p < .001$). Moreover, the results indicated that in both mothers (CLIP F4; $\beta = -.29$, $p < .001$) and fathers (CLIP F4; $\beta = -.47$, $p < .001$), negative perceptions after childbirth were associated with less sensitive behavior at six months postpartum. Parental responses on bonding difficulties (CLIP F1), concerns about the infant (CLIP F2) and discontent about the hospital care (CLIP F3), in contrast, did not contribute to the prediction of sensitivity in parents.

Table 3.6a Hierarchical multiple regressions predicting the quality of maternal interactive behavior at 6 month postpartum [a]

Mothers		Sensitivity				Intrusiveness				Withdrawal			
		B (SE)	**β**	R^2	ΔR^2	**B** (SE)	**β**	R^2	ΔR^2	**B** (SE)	**β**	R^2	ΔR^2
1	Educational Level[1]	.69 (.11)	.38 ***	.15	.15 ***	−.52 (.10)	−.35 ***	.15	.15 ***	−.37 (.10)	−.25 ***	.07	.07 ***
	Experience Parenting[2]	−.13 (.17)	−.05			−.42 (.15)	−.18 **			.18 (.15)	.08		
2	Educational Level[1]	.70 (.12)	.39 ***	.15	.00	−.53 (.10)	−.35 ***	.16	.01	−.39 (.10)	−.26 ***	.07	.00
	Experience Parenting[2]	−.11 (.18)	−.04			−.43 (.15)	−.19 **			.15 (.16)	.06		
	MP-Group[3]	.03 (.21)	.01			.07 (.18)	.03			−.23 (.18)	−.10		
	VP-Group[3]	.10 (.21)	.04			−.10 (.18)	−.04			−.10 (.19)	−.04		
3	Educational Level[1]	.56 (.12)	.31 ***	.25	.10 ***	−.43 (.10)	−.29 ***	.26	.10 ***	−.23 (.10)	−.16 *	.21	.14 ***
	Experience Parenting[2]	−.21 (.18)	−.08			−.31 (.15)	−.14 *			.22 (.15)	.10		
	MP-Group[3]	.00 (.24)	.00			−.13 (.20)	−.06			−.26 (.20)	−.11		
	VP-Group[3]	.22 (.32)	.08			−.60 (.27)	−.26 *			−.31 (.27)	−.13		
	CLIP F1 Difficulty Bonding[4]	−.05 (.04)	−.10			.03 (.03)	.07			.02 (.03)	.05		
	CLIP F2 Concerns Infant[4]	.02 (.07)	.03			.09 (.05)	.17			.02 (.06)	.03		
	CLIP F3 Discontent Hospital[4]	.03 (.05)	.04			.03 (.04)	.05			−.05 (.05)	−.07		
	CLIP F4 Negative Perceptions[4]	−.18 (.04)	−.29 ***			.14 (.04)	.27 ***			.20 (.04)	.39 ***		

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

[a] **=** higher scores represent more of the indicated quality of parental behavior toward the infant, i.e., more sensitive, intrusive or withdrawn behavior.

[1] = higher scores represent a higher parental educational level.

[2] = experience in parenting was dummy coded, with first-time parenting as reference group.

[3] = prematurity was dummy coded, with moderately premature infants (MP-group; ≥ 32 - < 37 weeks GA) and very premature infants (VP-group; < 32 weeks GA) as dummy variables, and term infants (T-group; ≥ 37 weeks GA) as reference group.

[4] = higher scores represent more negative experiences and perceptions in parents.

Table 3.6b Hierarchical multiple regressions predicting the quality of paternal interactive behavior at 6 month postpartum [a]

Fathers		Sensitivity				Intrusiveness				Withdrawal			
		B (SE)	**β**	R^2	ΔR^2	**B** (SE)	**β**	R^2	ΔR^2	**B** (SE)	**β**	R^2	ΔR^2
1	Educational Level[1]	.38 (.10)	.25 ***	.06	.06 ***	−.20 (.08)	−.18 *	.03	.03 *	−.45 (.10)	−.29 ***	.10	.10 ***
	Experience Parenting[2]	−.14 (.18)	−.06			−.06 (.13)	−.03			.36 (.18)	.14 *		
2	Educational Level[1]	.35 (.10)	.23 **	.09	.03 *	−.18 (.08)	−.16 *	.05	.02	−.43 (.11)	−.28 ***	.11	.01
	Experience Parenting[2]	−.22 (.18)	−.09			−.01 (.14)	−.01			.40 (.18)	.15 *		
	MP-Group[3]	−.46 (.21)	−.17 *			.33 (.16)	.17 *			.20 (.20)	.07		
	VP-Group[3]	−.42 (.21)	−.16 *			.24 (.16)	.12			.29 (.21)	.11		
3	Educational Level[1]	.14 (.10)	.09	.28	.19 ***	−.06 (.08)	−.06	.17	.12 ***	−.19 (.10)	−.12	.30	.19 ***
	Experience Parenting[2]	−.11 (.17)	−.04			−.06 (.13)	−.03			.20 (.17)	.08		
	MP-Group[3]	−.18 (.23)	−.07			.22 (.18)	.11			.11 (.23)	.04		
	VP-Group[3]	.16 (.32)	.06			.03 (.25)	.02			.05 (.32)	.02		
	CLIP F1 Difficulty Bonding[4]	.00 (.04)	−.01			−.01 (.03)	−.02			−.08 (.04)	−.15 *		
	CLIP F2 Concerns Infant[4]	−.09 (.07)	−.14			.02 (.05)	.05			.02 (.07)	−.04		
	CLIP F3 Discontent Hospital[4]	−.02 (.06)	−.02			.10 (.05)	.14 *			.05 (.07)	.05		
	CLIP F4 Negative Perceptions[4]	−.29 (.05)	−.47 ***			.15 (.04)	.33 ***			.32 (.05)	.51 ***		

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

[a] **=** higher scores represent more of the indicated quality of parental behavior toward the infant, i.e., more sensitive, intrusive or withdrawn behavior.

[1] = higher scores represent a higher parental educational level.

[2] = experience in parenting was dummy coded, with first-time parenting as reference group.

[3] = prematurity was dummy coded, with moderately premature infants (MP-group; ≥ 32 - < 37 weeks GA) and very premature infants (VP-group; < 32 weeks GA) as dummy variables, and term infants (T-group; ≥ 37 weeks GA) as reference group.

[4] = higher scores represent more negative experiences and perceptions in parents.

Predictors of parental intrusiveness

At step 1, entry of the demographic predictors accounted for 15% ($R^2 = .15$, $p < .001$) of the variance in maternal intrusiveness, and 3% ($R^2 = .03$, $p < .05$) of the variance in paternal intrusiveness. The infant's prematurity entered at step 2 did not explain additional variance in mothers ($\Delta R^2 = .01$, *ns*), and it marginally accounted for 2% of the variance in fathers ($\Delta R^2 = .02$, $p < .10$). With the CLIP factors added to the prediction of intrusiveness at step 3, an additional 10% of the variance in maternal intrusiveness ($\Delta R^2 = .10$, ΔF (4, 208) = 7.19, $p < .001$) and 12% ($\Delta R^2 = .12$, ΔF (4, 195) = 6.94, $p < .001$) in paternal intrusiveness could be explained. Addition of the interaction terms did not add significant variance to the model of maternal ($\Delta R^2 = .04$, ΔF (8, 200) = 1.47, *ns*) or paternal ($\Delta R^2 = .03$, ΔF (8, 187) = .81, *ns*) intrusiveness. The final model significantly predicted the presence of intrusive behavior in parents, with in total 26% ($R^2 = .26$, F (8, 208) = 9.08, p < .001) of explained variance in mothers and 17% ($R^2 = .17$, F (8, 195) = 5.10, p < .001) in fathers. Similar to the results on sensitivity, mothers' intrusiveness scores were partially explained by demographic characteristics. A higher level of formal education ($\beta = -.29$, p < .001) and previous experience in parenting ($\beta = -.14$, p < .05) were found to be associated with lower maternal intrusiveness, while fathers' scores on intrusiveness were unaffected by these characteristics. Furthermore, mothers of very preterm infants (VP-group) were found to be less intrusive compared with mothers of term infants ($\beta = -.26$, p < .05). The results further indicated that the expression of dissatisfaction with hospital care (CLIP F3; $\beta = .14$, p < .05) together with the presence of negative perceptions in the postnatal phase (CLIP F4; $\beta = .33$, p < .001) also contributed significantly to the amount of explained variance of intrusiveness among fathers. The latter also accounted for mothers; negative maternal perceptions after birth were associated with later intrusive behavior toward the infant (CLIP F4, $\beta = .27$, p < .001). Parental responses on bonding difficulties (CLIP F1) and concerns about the infant (CLIP F2) were unrelated to parental intrusiveness.

Predictors of parental withdrawal

The demographic variables entered at step 1 accounted for 7% ($R^2 = .07$, $p < .01$) of the variance in maternal withdrawal and 10% ($R^2 = .10$, $p < .001$) of the variance in paternal withdrawal. The infant's prematurity entered at step 2 did not explain additional variance in mothers ($\Delta R^2 = .00$), nor in fathers ($\Delta R^2 = .01$, *ns*). With the CLIP factors added to the prediction at step 3, an additional 14% of the variance in maternal withdrawal ($\Delta R^2 = .14$, ΔF (4, 208) = 9.21, $p < .001$) and 19% ($\Delta R^2 = .19$, ΔF (4, 195) = 13.06, $p < .001$) in paternal withdrawal could be explained. Addition of the interaction terms did not add significant variance to the model of maternal ($\Delta R^2 = .04$, ΔF (8, 200) = 1.38, *ns*) or paternal ($\Delta R^2 = .02$, ΔF (8, 187) = .62, *ns*) withdrawal. The final model significantly predicted the presence of withdrawn behaviors in parents, accounting for 21% of the variance in mothers ($R^2 = .21$,

F (8, 208) = 7.05, p < .001) and 30% in fathers (R^2 = .30, F (8, 195) = 10.19, p < .001). The results of the final model indicated that higher educated mothers tend to withdraw less during interaction with their infant compared with lower educated mothers (β = –.16, p < .05). Also, less withdrawal was observed in fathers who expressed the difficulties they faced in bonding with their infant (CLIP F1; β = –.15, p < .05). Moreover, similar to the results on sensitivity and intrusiveness, the presence of negative perceptions in the postnatal phase was found to significantly predict later withdrawal behaviors in both mothers (CLIP F4; β = .39, p < .001) and fathers (CLIP F4; β = .51, p < .001). Parental concerns about the infant (CLIP F2)and dissatisfaction with the hospital care (CLIP F3) failed to contribute to the prediction of withdrawal in parents.

DISCUSSION

The link between the quality of parental interactive behavior and later developmental outcome in infants has been widely acknowledged and the importance of high-quality parental care for developmentally vulnerable infants is often emphasized. Less is known, however, about the impact that preterm childbirth can have on how parents behave and interact with their children. Inconsistent findings across and within previous studies highlight the need for further investigation of risk factors that adversely affect parenting of infants born preterm. The present study contributes to the existing literature by examining the relation between negative parental experiences and perceptions of birth-related stressors at one month postpartum (using the CLIP interview) and the quality of their interactive behavior at six months postpartum (using NICHD observations), in a sample of both mothers and fathers of term, moderately preterm, and very preterm infants. Three key findings emerged from the present study. The first finding concerns the factor structure of the CLIP. The second finding is the observation that premature childbirth is associated with increased levels of parental concerns and negative experiences in the postpartum period, as well as less optimal father-infant interaction after six months. Nevertheless, the third finding reveals that not the event of preterm birth per se is predictive of later difficulties in parent-infant interactive behavior, but rather the presence of negativity and distortions in parents. Each of these finding will be considered in turn.

The first goal of the study was to examine the internal structure of the CLIP, an interview originally designed to assess negative parental experiences and perceptions after birth of a high-risk infant. This instrument has been claimed to be a potentially useful instrument for the identification of parents in psychological need (Keren et al., 2003; Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993). The exploratory and confirmatory factor analyses of the CLIP yielded a four-factor model, suggesting that facing difficulties in parent-infant bonding (CLIP F1: difficulty with bonding), concerns about the infant's health and development (CLIP

F2: concerns about infant), discontentment about the hospital care (CLIP F3: discontent about hospital), and negative and unrealistic perceptions in general (CLIP F4: negative perceptions) are the interview's primary underlying dimensions of negative parental experiences and perceptions after childbirth. We therefore suggest that the CLIP factors should be considered being mutually independent. Both in parents of term as well as of preterm infants. This four-factor structure does not completely support the construct validity of the original two-factor structure as reported by Keren et al. (2003), yet there appears to be some overlap between their "maternal rejection factor" and the "negative perceptions factor" of the present study. Interestingly, in terms of content, the first, second, and third factors capture mainly infant characteristics (e.g., the infant's health status) as well as contextual characteristics (e.g., the course of pregnancy, delivery, and the hospital environment), while the fourth factor predominantly captures parental characteristics. At first glance, this negative perceptions factor (CLIP F4) seems to be a rather complex and heterogeneous construct, as it comprises various interview themes like parents' expectations regarding the infant's development, their social support network, the initial pregnancy announcement, and their organization of narratives. Yet, cognitively based disturbances such as negative perceptions, unrealistic expectancies, features of disorganized narratives, and misattributions in parents are well-known important precursors to child abuse and neglect (Azar, 2002; World Health Organization, 2002). Furthermore, previous research among parents with a newborn infant showed that small social support networks, distorted patterns of communication, and psychological problems are important risk factors for maladaptive parenting (Grietens, Geeraert, & Hellinckx, 2004). Positive expectations and conceptions about preterm infants, in contrast, have been shown to act as a protective mechanism for the adverse development of high-risk infants. Parents who are able to attenuate or neutralize the negative effects of prematurity by positive perceptions of their infant may positively change the developmental pathway of their vulnerable infant (Mastern & Gewirtz, 2006, Padovani et al., 2008).

As a secondary objective of the study, multiple group comparisons were conducted on parental experiences and perceptions at one month postpartum (CLIP factors) and parental interactive behavior at six months postpartum (NICHD observations). The findings support the common sense view that for parents, a preterm birth can be distressing and emotionally demanding (Müller-Nix & Ansermet, 2009). A premature birth entails inherent difficulties and worries for parents, such as heightened concerns about the infant's health and development and difficulties during the process of parent-infant bonding, because of the challenges that accompany the care for an immature, medically fragile, hospitalized infant. Our results further reveal that parents of very preterm infants also hold somewhat more negative and unrealistic perceptions in the postpartum phase compared with parents of term or moderately preterm infants (uncorrected for parental demographics). With regard to parental interactive behavior, our results suggest that at six months postpartum, maternal

interactive behavior is of an equal quality in mothers of term and preterm infants. Despite the difficult conditions during the first postpartum months, mothers of prematurely born infants seem to be relatively competent in their interactions. This finding is in accordance with the conclusions of Korja et al. (2012), who posit that mothers of preterm infants may be capable of developing compensatory caretaking styles during interactions with their infant. Our observations of paternal behavior, in contrast, suggest that fathers of preterm infants engage in interactions with their infant that are somewhat less sensitive and slightly more intrusive than fathers of term infants (uncorrected for paternal demographics and postpartum experiences and perceptions). As previous studies failed to focus on father-infant interaction, our results on paternal interactive behavior cannot be evaluated in the context of relevant, similar research outcomes. It is important to note that the group differences are small and located at the adaptive, not the less adaptive, ends of the scales. We, however, feel that these findings might be clinically relevant because infants, and in particular fragile preterm infants, are susceptible to external influences such as parenting behaviors during the sensitive developmental phase of the first postpartum months.

The third and ultimate goal of the study was to examine if the emotionally taxing event of preterm birth provides a context for the development of less optimal parental behavior and to investigate which factors are most predictive of the quality of future parent-infant interaction. Previous studies using the CLIP suggested that negative postpartum experiences and perceptions in general are associated with the development of adverse mother-infant interactions (Keren et al., 2003; Latva et al., 2008), but the results of the present study provide only partial support for that hypothesis. More specifically, multiple regression analyses revealed that only one of four CLIP factors explained a significant amount of variance of interactive behavior at six months postpartum, beyond the variability accounted by demographics and prematurity of the infant. The presence of negative and unrealistic perceptions (CLIP F4) in parents during the postnatal phase was found to significantly predict less sensitive, more intrusive, and more withdrawn behavior toward the infant at six months of age, whereas parents' experiences of bonding difficulties (CLIP F1), their concerns about the infant's health status (CLIP F2) and the hospital environment (CLIP F3) appeared to be relatively unimportant in predicting future parental behavior. Notably, while prematurity of the infant (i.e., a lower GA at birth) and a lower educational level were both associated with less sensitive and more intrusive father-infant interaction, these predictors lost significance when the CLIP factors were added to the regression models. Educational level, in contrast, was associated with a better quality of maternal interactive behavior.

Our findings demonstrate that variations in negative parental perceptions, assessed postnatally by means of the CLIP, predict the quality of interactive behavior in parents of term as well as in parents of preterm infants. The presence of negative parental perceptions can be regarded as a potential threat to the parent-infant relationship, in that unrealistic

expectations, negative attributions, and low perceived social support combined with features of disorganized narratives predict less optimal behaviors in parents. Moreover, the results suggest that neither the event of preterm birth itself nor parental concern about the infant's health and development or hospital environment is indicative of later difficulties in parent-infant interactive behavior, but rather the presence of negativity and distortions in parents. Regarding the development of positive interactions between parent and infant, we therefore conclude that an infant's medical risk (e.g., prematurity) and contextual risk factors associated with preterm birth (e.g., hospitalization) are less relevant and influential compared with parental risk factors (e.g., perceptions) during the postpartum period.

Despite the apparent strengths of the present study, such as the inclusion of both mother-infant and father-infant dyads and the use of interviews and observational methods rather than self-report, the present findings nevertheless should be interpreted in the light of some limitations. First, the CLIP is a multidimensional measure that provides rich information about parents' cognitions, experiences, emotions, and perceptions of birth stressors. It is, however, difficult to clearly differentiate between these distinct but interrelated dimensions. Second, the interviews were rated by the researchers, which may have increased the possibility of unintentional bias in support of the study hypotheses. Third, while the current study provides preliminary evidence of a valid and stable factor structure, additional research is needed to confirm the four-factor model of the CLIP in other samples. Fourth, even though variations in parental perceptions accounted for a substantial amount of explained variance in the regression models of parental behavior, the significant proportion of unexplained variance indicates that additional important influences remain to be determined. Fifth, the clinical suitability of the CLIP as a useful screening instrument still has to be established. Therefore, future studies using the CLIP should determine its long term predictive value. Sixth, this study extends previous research by the identification of factors that contribute to less optimal parenting behaviors after term and preterm birth, yet the results do not contribute to a better insight into the nature of the risk mechanisms. Additional research is required to gain understanding about the multiple risk factors and pathways leading to poor outcomes in the early parent-preterm infant relationship.

Conclusion and clinical implications

The results of the present study suggest that the taxing event of preterm birth does not necessarily provide a context for the development of less optimal parenting behaviors. Evaluation of parents' experiences and perceptions of birth-related stressors reveals that not prematurity in itself but particularly the presence of negative and unrealistic perceptions in parents is indicative of later difficulties in parent-infant interaction. As parental characteristics appear to have a greater impact on the quality of parent-infant interaction than do infant characteristics, early screening for social-cognitive or psychological problems in parents

may be warranted after both term and preterm birth. The CLIP may be a practical and easy accessible tool for hospital-based health-care professionals to identify parent-infant dyads at risk for poor parenting. Moreover, the instrument may be useful in planning appropriate individualized psychosocial intervention for families in need.

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APPENDIX

Appendix 3.A Adjusted coding scheme of the CLIP, for parents of term and preterm infants

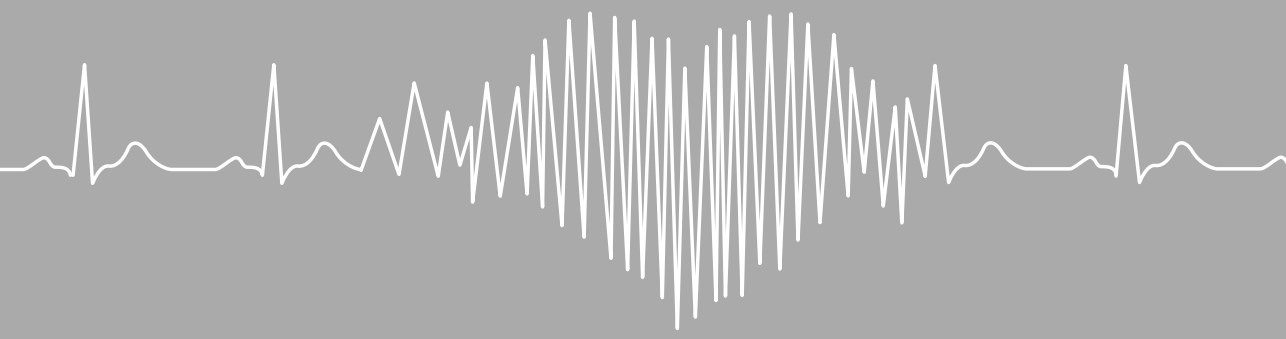
Main area	**Interview items**	**Classification** (Likert scale)
1. Infant's current condition	1. Health status of the infant	Good (1), Average with potential medical risks (2), Severe, worrisome health status (3)
	2 Fear of losing the infant	No fear of loss (1), Minor fear of loss (2), Fear of loss, no preoccupation (3), Preoccupation with loss (4)
2. Pregnancy course	3 First reaction to the pregnancy	Positive (1), Ambivalent (2), Negative (3)
	4 Planned pregnancy	Yes (1), No (2)
	5 Course of the pregnancy	No complications (1), Minor complications (2), Moderate complications (3), Severe complications (4) *(physical/emotional complications for mothers; emotional complications for fathers)*
	6 Timing of pregnancy feeling real	Pregnancy test (1), First ultrasound (2), Fetal movements (3), Delivery (4), Never (5)
	7 Feeling that something could go wrong during the pregnancy	No concerns (1), Common concerns (2), Severe concerns (3)
3. Labor and delivery	8 Readiness for delivery	Expected (1), Somehow expected (2), Totally unexpected (3)
	9 Fear of loss during delivery	No fear (1), Fear for herself/his partner (2), Fear for infant (3), Fear for infant and herself/his partner (4) *(difference for mothers/fathers)*
4. Relationship with infant and feelings as parent	10 First feelings towards the infant	Positive (1), Ambivalent (2), Negative (3)
	11 Bonding with the infant	Yes, immediately after birth (1), Yes, developed during first few weeks (2), No, not (yet) developed (3)
	12 Present feelings towards the infant	Positive (1), Ambivalent (2), Negative (3)
	13 Feeling of mutual recognition	Definitely (1), In doubt (2), None (3)
	14 Confidence in self as parent of the infant	Secure (1), Not quite secure (2), Insecure (3)
	15 Raising by own parents	Positive (1), Ambivalent (2), Negative (3)

Appendix 3.A *Continued*

Main area	**Interview items**	**Classification** (Likert scale)
5. Reactions to hospital and staff	16 Confidence in the hospital staff	Total confidence (1), Partial confidence (2), No confidence (3)
	17 Confidence in the hospital environment	Hospital enhances feeling of security (1), Hospital is securing but frightening (2), Hospital is frightening and not securing (3)
	18 Reaction to lack of control over the infant in the hospital	Not bothered with passive role or not mentioned (1), Bothered with passive role but no influence on parental feelings (2), Bothered with passive role and parental feelings are negatively influenced (3)
6. Support system	19 Experience for partner	Positive (1), Ambivalent (2), Negative (3)
	20 Support from spouse	Full spousal support (1), Partial spousal support (2), Absent spousal support (3)
	21 Relationship with spouse changed	Positive change (1), Relationship unaffected (2), Negative change (3)
	22 Support from others (i.e., family, friends)	Full social support (1), Partial social support (2), Absent social support (3)
7. Discharge and beyond	23 Foreseen development of the infant	Positive (1), Ambivalent (2), Negative (3)
	24 Expectations for the infant's future	Appropriate expectations (1), Partially appropriate expectations (2), Discrepant expectations (3)
8. Quality of narratives	25 Affect during interview	Positive (1), Mixed (2), Negative (3)
	26 Organization of content narrative	Well organized (1), Moderately organized (2), Poorly organized (3)
	27 Richness of content narrative	Full answers (1), Partial answers (2), Short and/or Laconic answers (3)

CHAPTER 4

Maternal psychological distress after preterm birth: Disruptive or adaptive?



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ABSTRACT

Objective. Maternal postpartum distress is often construed as a marker of vulnerability to poor parenting. Less is known, however, about the impact of postpartum distress on parenting an infant born prematurely. The present study investigated whether high distress levels, which are particularly prevalent in mothers of preterm born infants, necessarily affect a mother's quality of parenting.

Method. Latent Class Analysis was used to group mothers (N = 197) of term, moderately, and very preterm born infants, based on their levels of distress (depression, anxiety, and PTSD symptoms) at one month postpartum, and their quality of parenting at one and six months postpartum. Parenting quality was assessed on the basis of maternal interactive behaviors (sensitivity, intrusiveness, and withdrawal) using observations, and maternal attachment representations (balanced, disengaged, or distorted) using interviews.

Results. A 5-Class model yielded the best fit to the data. The first Class (47%) of mothers was characterized by low distress levels and high-quality parenting, the second Class (20%) by low distress levels and low-quality parenting, the third Class (22%) by high distress levels and medium-quality parenting, the fourth Class (9%) by high distress levels and high-quality parenting, and finally the fifth Class (2%) by extremely high levels of distress and low-quality parenting.

Conclusions. While heightened distress levels seem inherent to preterm birth, there appears to be substantial heterogeneity in mothers' emotional responsivity. This study indicates that relatively high levels of distress after preterm birth do not necessarily place these mothers at increased risk with regard to poor parenting. Conversely, low distress levels do not necessarily indicate good-quality parenting. The results of the present study prompt a reconsideration of the association between postpartum distress and parenting quality, and challenge the notion that high levels of maternal distress always result in low-quality parenting practices.

INTRODUCTION

Within the field of developmental psychology, the effects of maternal postpartum psychological distress on child development have received much attention. Moreover, the prevention, diagnosis, and treatment of distress in mothers is given much emphasis in pre-, peri- and postnatal healthcare. Prior studies reported that postpartum distress is quite common among new mothers, with prevalence estimates around 10-15% for postpartum depression (Brockington, 2004), around 8-10% for postpartum anxiety (Woolhouse, Brown, Krastev, Perlen, & Gunn, 2009), and between 1.7-9% for post-traumatic stress responses (PTSD; Beck, Gable, Sakala, & Declercq, 2011), with considerable comorbidity between the different types of distress (Austin et al., 2010). These prevalence rates have raised concern among healthcare providers, because negative postpartum emotions are known to affect not only maternal wellbeing, but also infant developmental outcomes. More specifically, maternal distress after childbirth can have a long-term adverse impact on the infants' quality of attachment to their mothers, as well as on their behavioral, cognitive, and socio-emotional functioning (Glasheen, Richardson, & Fabio, 2010; Goodman et al., 2011).

Distress and parenting

The association between maternal postpartum distress and compromised infant development has been largely attributed to disturbances in the emotional and behavioral exchanges between the mother and her infant (Giallo, Cooklin, Wade, D'Esposito, & Nicholson, 2014). Maternal distress can interfere with the mother's ability to form positive expectations and representations of her infant and to interact sensitively with her infant. For example, depressed or anxious mothers have been found to develop non-optimal (i.e., non-balanced) attachment representations and, in particular, distorted representations of the infant; that is, representations characterized by insensitivity or unrealistic expectations of the infant and by incoherent, confused, preoccupied, contradictory, or even bizarre descriptions of the infant (see Vreeswijk, Maas, & Van Bakel, 2012, for a review). Furthermore, maternal distress is a key factor affecting mothers' parenting practices. Depressed or anxious mothers have been observed to engage not only in withdrawn, passive, or disengaged interactional behaviors, but also in intrusive, controlling, or hostile parent-infant interactions (Goodman & Brand, 2009).

Distress and parenting after preterm childbirth

Whereas postpartum psychological distress is quite common in mothers of infants born at term gestation, mothers of infants born preterm experience even more often high levels of distress (Bener, 2013). Postpartum depression rates of up to 40 percent (Vigod, Villegas, Dennis, & Ross, 2010), and anxiety and PTSD prevalence rates of up to 23 percent (Feeley

et al., 2011; Lefkowitz, Baxt, & Evans, 2010) have been reported among mothers of preterm infants. These substantial percentages are not surprising, as mothers are confronted with various serious stressors after preterm birth. The infant's physical condition, early separation from the infant, uncertainty about the infant's outcome, and anticipated loss of the infant, are only some of the stressors that may result in feelings of stress, depression, anxiety, and even to symptoms of traumatization in mothers (Goldberg & DiVitto, 2002). Given the complications and challenges that accompany parenting an infant born preterm, one might conclude that heightened levels of distress are inherent to the situation these mothers find themselves in. It remains debatable, however, as to whether or not heightened maternal stress levels after preterm birth are necessarily associated with less adequate parenting.

This specific question has previously been addressed in a small number of studies yielding inconclusive findings. On one hand, some studies indicated that mothers of preterm infants who experience high levels of distress are at serious risk with regard to adverse parenting. These studies revealed higher incidences of non-optimal and unbalanced attachment representations and a lower quality of maternal interactive behaviors among mothers with high distress levels after preterm birth (Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Muller-Nix, 2011; Muller-Nix et al., 2004). Other studies, however, suggested that in cases of preterm birth some degree of distress in mothers is inevitable, and perhaps even beneficial for parenting an infant born preterm. Borghini et al. (2006), for instance, demonstrated that particularly mothers of high-risk preterm infants who were emotionally distressed, anxious, and worried about their child's health and future development in the postpartum period developed a strong bond with their infant. The authors linked maternal emotional arousal after preterm birth to higher maternal involvement (e.g., providing comfort care). In line with this, Levy-Shiff (1989) and Holditch-Davis, Schwartz, Black and Scher (2007) showed that mothers of preterms who were highly distressed and concerned due to the hospital environment and their infant's health condition showed more caregiving behaviors during the infant's hospitalization and after discharge of the infant. Mothers who experience emotional arousal because of their infant's fragile condition, may adopt a compensatory parenting style in which they attune and adjust their behavior to the needs and capacities of their immature infant. Inhibition and suppression of maternal emotions, in contrast, could lead to detachment and difficulties in establishing a close mother-infant relationship.

The present study

In this explorative study, we investigated whether heightened levels of maternal distress after preterm birth place mother-infant dyads at risk for poor parenting. We hypothesized that distinct subgroups of mothers could be identified on the basis of maternal levels of distress and parenting quality. Latent Class analysis (LCA) was used to examine the relation between maternal distress (PTSD, depression, and anxiety symptoms), at one month postpartum,

and maternal quality of parenting (interactive behaviors and attachment representations) at one and six months postpartum, among mothers of term, moderately preterm, and very preterm infants. The advantage of the use of LCA is its comprehensive approach to identify population heterogeneity in maternal levels of distress and parenting quality.

METHOD

Participants

This study is part of a larger longitudinal study among parents with term and preterm infants (Tooten, 2012), receiving ethical approval from the Catharina Hospital, Eindhoven, The Netherlands. Two-hundred and twenty-two mothers of term and preterm infants participated in the study, of whom 197 provided data for at least one of the distress measures *and* at least one data point on the parenting variables. The analysis sample consisted of 71 mothers of term infants (≥37 weeks gestational age (GA)), 64 mothers of moderately preterm infants (≥32 - <37 weeks GA), and 62 mothers of very preterm infants (<32 weeks GA) (total N = 197). Six mothers dropped out of the study at six months postpartum, an attrition rate of 3%. The data were characterized by few missing values: between 1.5%-3.6% of the distress outcomes, 3% of the parenting outcomes, and between 0%-3.6% of the variables for post-hoc comparisons were missing. No systematic patterns of or covariates related to missingness were found.

Mothers were recruited from eight maternity wards and two neonatal intensive care units in The Netherlands. Mothers with poor understanding of the Dutch language were excluded from participation. Eligible mothers were invited by nurses to participate before the delivery or within 24 hours after birth. The nurses informed the mothers about the aims and design of the study and provided them with an information brochure. It was emphasized that participation was voluntary, without financial compensation, and that they were free to withdraw from the study at any time, with no consequences for treatment of the child. All participating mothers gave their written consent. Baseline demographic and clinical characteristics of the study participants are presented in Table 4.3.

Procedure

At one month postpartum, mothers were visited at home or in the hospital and asked to individually complete three questionnaires measuring psychological distress. In addition, video recordings of mother-infant interactions were made during daily moments of caretaking, e.g., bathing, feeding, changing; or touching, holding and vocalizing to the infant in case of a very preterm infant. These recordings were analyzed afterwards to evaluate the mother's interactive behavior. At six months postpartum, mothers were visited at home and

interviewed. Video recordings of the interview were analyzed afterwards to evaluate the mothers' attachment representations of their infant.

Measures

Psychological distress

The 14-item *Perinatal Posttraumatic Stress Disorder Questionnaire (*PPQ; Quinnell & Hynan, 1999*)* was used to assess early maternal PTSD symptomology. Items were rated on a dichotomous scale (yes/no; sum-score range = 0-14), with higher scores reflecting more PTSD symptoms. Scores ≥6 correspond to mild or severe PTSD symptoms (Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex, & Ansermet, 2003).

The 10-item *Edinburgh Postnatal Depression Scale* (EPDS; Cox, Holden, & Sagovsky, 1987) was used to evaluate postpartum depression. Items were rated on 4-point Likert scales (sum-score range = 0-30), with higher scores indicating more depressive symptoms. Scores ≥10 indicate minor depression and scores ≥13 indicate major depression (Matthey, Henshaw, Elliott, & Barnett, 2006).

The 20-item *State-Trait Anxiety Inventory* (STAI-State; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) was used to determine levels of state anxiety. Items were rated on 4-point Likert scales (sum-score range = 20-80) with higher scores indicating higher levels of anxiety. A cut-off threshold of 40 is used to identify highly anxious women (Grant, McMahon, & Austin, 2008).

The questionnaires are reliable and well-validated measures to assess psychological distress in the postpartum period (Callahan & Hynan, 2002; Tendais, Costa, Conde, & Figueiredo, 2014). The internal consistency estimates in the present sample were good to very good for the PPQ (α = .78), EPDS (α = .86), and STAI-State (α = .94).

Interactive behavior

Ratings of maternal interactive behavior were derived from 15-min video recordings capturing behavioral observations of daily dyadic mother-infant interactions. Mothers' verbal and nonverbal behaviors were rated by means of a coding manual (labeled NICHD coding scheme) developed by the U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Child Health and Human Development Early Care Research Network (1999). Minor adaptations were made to the instrument to make it applicable to our population of mothers with preterm infants. In the original coding scheme maternal behavior is rated on six 4-point global items. In the present study, these items were combined into three subscales: 'Sensitivity to non-distress' and 'Positive regard for the infant' were combined to assess *Sensitivity*, 'Intrusiveness' and 'Negative regard for the infant' were combined to assess *Intrusiveness,* and 'Detachment' and 'Flatness of affect' were combined

to assess *Withdrawal* in mothers. The subscale scores range from very uncharacteristic to very characteristic behavior on a 7-point scale (range = 1-7). A high score on *Sensitivity* indicates good timing faced to the infant's interest and arousal level, an appropriate level of stimulation, praising the infant, and speaking in a warm tone of voice during mother-infant interaction. Mothers with a high score on *Intrusiveness* generally fail to allow the infant a 'turn' or the opportunity to respond at his/her pace but instead offer a continuous barrage of stimulation. They may show disapproval of the infant's actions and can be rough in daily care routines. Mothers with a high score on *Withdrawal* rarely make eye contact with the infant and exhibit a blank facial expression. They talk to or touch the infant infrequently and respond minimally to the infant's vocalizations, smiles, or actions.

The videotapes were scored by independent coders. Prior to scoring, the coders received standardized training until 80% reliability was reached, along with regularly scheduled supervision. Approximately 15% of the videos were randomly selected and double coded. Intraclass correlation coefficients (ICC) for inter-rater agreement were .67 (sensitivity), .73 (intrusiveness), and .71 (withdrawal).

Attachment representations

Maternal attachment representations were assessed using the Working Model of the Child Interview (WMCI; Zeanah, Benoit, & Barton, 1986), a semi-structured interview developed to elicit and classify a parent's perceptions of and subjective experiences with the personality characteristics and behavior of the infant, as well as the relationship with the infant. Previous research has demonstrated substantial concordance between the WMCI and traditional measures of infant attachment (e.g., the Strange Situation) and adult attachment (e.g., the Adult Attachment Interview) (Benoit, Parker, & Zeanah, 1997).

The WMCI is scored on three subscales, including the *qualitative* (or organizational), *content*, and *affective* features of mothers' narratives. These subscales are used to classify mothers' representations as balanced, disengaged, or distorted. *Balanced representations* are characterized by rich and coherent ideas of the infant and of the relationship with the infant. They usually include both positive and negative characteristics of the infant. Parents are appreciative of the infant's subjective experiences, value the relationship with the infant, and respect the infant as an individual. Non-balanced representations, in contrast, can be either disengaged or distorted. *Disengaged representations* are characterized by a sense of indifference and emotional distance from the infant. The descriptions of the infant are primarily rational and unelaborated. Parents seem to devaluate the impact of parenting on the infant's development. *Distorted representations* are predominantly characterized by confusion and preoccupation. Parents can be preoccupied with other concerns, resulting in an inability to focus incisively on characteristics of the infant. Moreover, they may have unrealistic expectations of their infant or are very insensitive to the infant.

The interviews were conducted by one of the researchers and lasted approximately 45-60 minutes. The interviews were videotaped and subsequently coded by the researchers (H.H., R.H., or A.T.) who are trained and reliable WMCI coders. Prior to scoring the interviews, the coders were trained by one of the authors (H.v.B.), who received training by the WMCI developers (Zeanah and Smyke), until 80% reliability was reached. To assess the level of agreement between raters, 20 interviews were randomly selected and double coded. The raters showed substantial agreement (Cohen's kappa = .68).

Analytic strategy

Latent Class Analysis (LCA), a comprehensive method of probabilistically classifying individuals from a heterogeneous population into smaller more homogenous unobserved subgroups, was used to identify subsets of mothers who share similar patterns of distress (i.e., PTSD, depression, and anxiety symptoms) and maternal interactive behaviors (i.e., sensitivity, intrusiveness, and withdrawal) at one month postpartum, and attachment representations (i.e., balanced, disengaged, or distorted) at six months postpartum. LCA was performed using Latent Gold Version 5.0 (Vermunt & Magidson, 2005), with the PPQ, EPDS, and STAI scores as continuous indicators, the NICHD scores as ordinal indicators, and the WMCI classifications as nominal indicators. To make use of all available data under the missing-at-random (MAR) assumption, a full information maximum likelihood procedure was used to estimate the models. To safeguard against local maxima, 250 random start values were used for each model. Model solutions starting from one up to seven classes were evaluated and compared. A final model was selected based on model fit as indicated by the Bayesian Information Criterion (BIC), with lower values indicating a better relative fit (Nylund, Asparouhov, & Muthén, 2007). This was supplemented by information from various fit statistics including the AIC, the classification error, and the entropy R2. Along with inspection of a log likelihood scree plot (a visual inspection of where improvement in fit flattens out). Mothers were assigned to the class for which they had the highest posterior membership probability (i.e., modal assignment). The classes were subsequently compared on the proportion of mothers of term, moderately, and very preterm infants, as well as on infant medical data and maternal socio-demographic data using ANOVA's and chi-square tests in SPSS.

RESULTS

Extraction of latent classes

Five subgroups of mothers were identified and labeled based on their levels of postpartum distress and parenting quality. A 5-Class solution yielded the best fit to the data, see Table 4.1. The 5-Class model was compared with a 4-Class model, which was more parsimonious

but had a slightly higher BIC value. A bootstrap LR test with 2000 replications showed that the more complex model with five classes fitted the data significantly better, p <.001. Furthermore, the classification error of 7% supports the feasibility of differential assignment of mothers across the 5 classes.

Table 4.1 Model comparison

Number of classes	BIC	AIC	Classification error	Entropy R2
1	5503	5428	0.00	
2	5331	5226	0.03	.86
3	5277	5142	0.07	.82
4	5243	5079	0.06	.86
5	**5236**	**5042**	**0.07**	**.87**
6	5239	5016	0.06	.87
7	5258	5005	0.11	.79

The analyses revealed that 47% (n = 96) of the mothers were in the first class, *Low distress – High-quality parenting (Class L-H)*, characterized by the lowest levels of psychological distress, high levels of sensitivity and low levels of intrusiveness and withdrawal behaviors, with mothers mainly having balanced attachment representations. 20% (n = 38) were in the second class, *Low distress – Low-quality parenting (Class L-L)*, characterized by low distress levels, low levels of sensitivity and moderate levels of intrusiveness and high levels withdrawal behaviors, with mothers mainly having disengaged representations of their infant. 22% (n = 42) were in the third class, *High distress – Medium-quality parenting (Class H-M)*, characterized by high distress levels, moderate levels of sensitivity, intrusiveness and withdrawal behaviors, with mothers mainly having balanced or distorted representations. 9% (n = 17) were in the fourth class, *High distress – High-quality parenting (Class H-H),* characterized by high distress levels, the highest levels of sensitivity and the lowest levels of intrusiveness and withdrawal behaviors, with mothers mainly having balanced representations. Finally, 2% (n = 4) were in the fifth class, *Extreme distress – Low-quality parenting (Class E-L)*, characterized by very high distress levels, the lowest levels of sensitivity, the highest levels of intrusiveness, and high levels of withdrawal behaviors, with mothers all having distorted representations. The latent classes are depicted in Figure 4.1. The characteristics of the five classes are summarized in Table 4.2.

As a supplementary step, the rates of clinically significant levels of psychological disorders were examined. In classes L-H and L-L, 0%-5% of the mothers reported symptoms above the clinical thresholds for PTSD, depression, and anxiety, whereas the other classes comprised 36%-100% clinical cases (see Table 4.2).

Figure 4.1 Latent classes of maternal postpartum distress and parenting quality

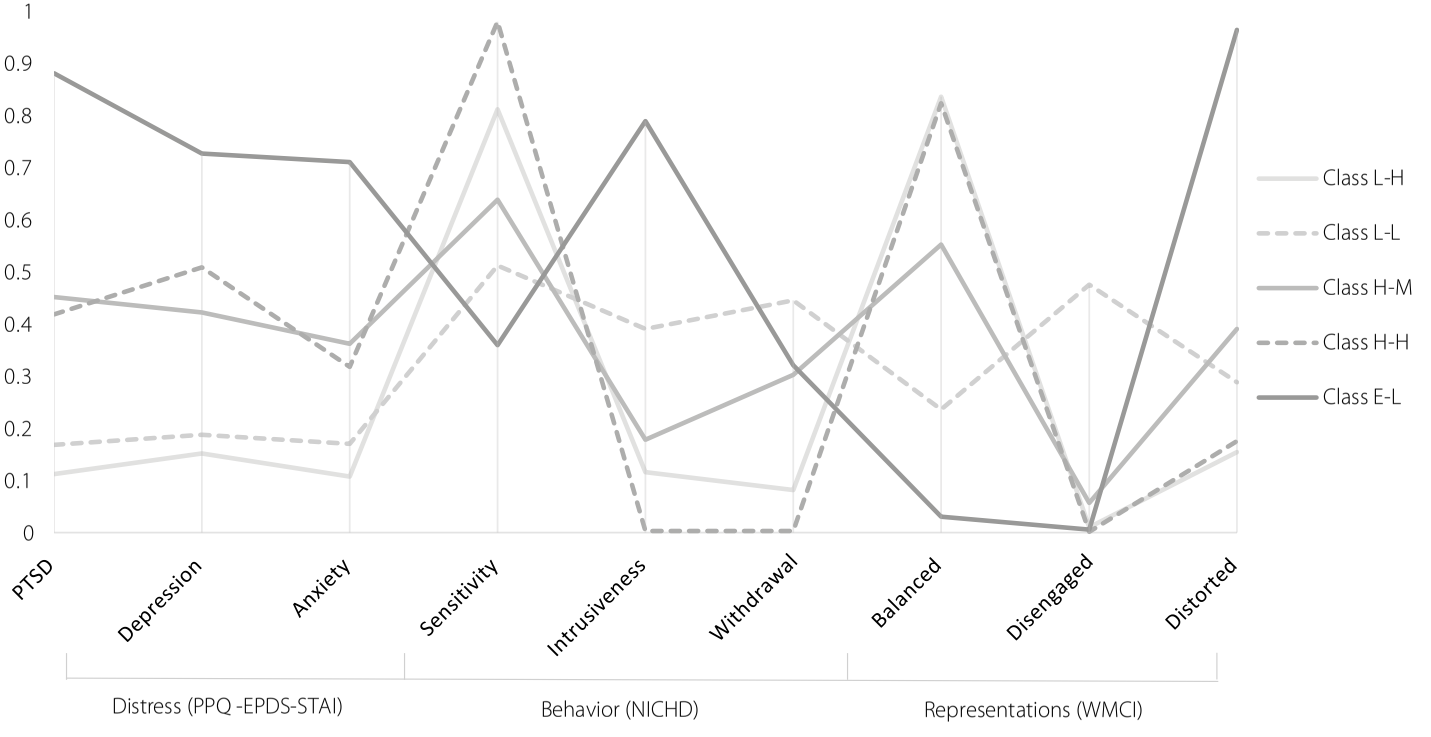

Table 4.2 Characteristics of the five classes in terms of psychological distress and parenting quality (N = 197).

	Class L-H n = 96, 47%	**Class L-L** n = 38, 20%	**Class H-M** n = 42, 22%	**Class H-H** n = 17, 9%	**Class E-L** n = 4, 2%
Psychological distress					
PPQ PTSD	1.59	2.27	6.25	5.87	12.33
Clinical cases, %	3	5	65	56	100
EPDS Depression	3.41	4.18	11.59	10.00	16.75
Clinical cases, %	1	5	73	47	100
STAI Anxiety	25.51	28.54	38.83	37.00	57.00
Clinical cases, %	0	0	38	36	100
Interactive behaviors					
Sensitivity	5.85	4.02	4.76	6.88	3.00
Intrusiveness	1.46	2.64	1.76	1.00	4.33
Withdrawal	1.44	3.28	2.55	1.00	2.67
Attachment Representations					
Balanced, %	84.95	16.22	53.66	81.25	0
Disengaged, %	0	56.76	4.88	0	0
Distorted, %	15.05	27.03	41.46	18.75	100

Numbers represent means, unless otherwise specified.
Clinical thresholds for distress symptoms: PPQ ≥ 6, EPDS ≥ 10, STAI > 40.

Comparison of classes

Classes L-H, L-L, H-M, and H-H were compared on infant medical and maternal socio-demographic data. Class E-L consisted of just four mothers and was therefore excluded from post-hoc class comparisons and only described qualitatively.

The classes differed significantly on the infant's GA, see Table 4.3. The majority of mothers in Class L-H had a term-born infant and only 13% of them had a very preterm infant. Mothers in the other classes more often had a preterm infant, with an overrepresentation of mothers of very preterm infants in Class H-M and H-H. Moreover, infants of mothers in Class H-M and H-H more often had a fragile health status: a lower birth weight, lower Apgar score, and more days spent in the incubator and the hospital. The maternal data showed no significant differences for delivery mode, parity, age, and marital status. Yet significant differences were found for educational level. Mothers in Class L-H, M-H, and H-H were mainly mothers with a medium or high educational level, whereas mothers in Class L-L more often had low or medium educational levels.

Table 4.3 Differences between the classes in GA group, infant medical data, and maternal demographic data (N = 197).

	Class L-H n = 96, 47%	**Class L-L** n = 38, 20%	**Class H-M** n = 42, 22%	**Class H-H** n = 17, 9%	**Class E-L**[1] n = 4, 2%	**F or χ^2**[1]	***p***
	n (%), m (sd)	n (%), m (sd)	n (%), m (sd)	n (%), m (sd)	n (%), m (sd)		
Gestational age group						34.33	***
Term, *n*	49 (51.0)[a]	10 (26.3)[ab]	8 (19.0)[b]	4 (23.5)[ab]	0 (0.0)		
Moderately preterm, *n*	35 (36.5)[a]	13 (34.2)[a]	11 (26.2)[a]	4 (23.5)[a]	1 (25.0)		
Very preterm, *n*	12 (12.5)[a]	15 (39.5)[b]	23 (54.8)[b]	9 (52.9)[b]	3 (75.0)		
Infant data							
Birth weight, *grams*	2790 (891)[a]	2328 (987)[b]	1904 (919)[b]	1964 (1083)[b]	1139 (649)	10.66	***
5-min Apgar	9.3 (1.1)[a]	8.8 (1.2)[ab]	8.7 (1.4)[b]	8.5 (1.9)[ab]	7.0 (3.2)	4.17	*
Incubator, *days*	6.7 (16.1)[a]	14.0 (17.7)[ab]	25.9 (24.7)[c]	27.6 (27.6)[bc]	44.0 (33.3)	11.84	***
Hospital, *days*	15.3 (23.1)[a]	27.2 (27.7)[ab]	42.5 (36.4)[b]	40.3 (35.3)[b]	67.3 (35.1)	10.45	***
Male Sex, *n*	42 (44.2)	23 (60.5)	21 (50.0)	11 (64.7)	1 (25.0)	4.41	*ns*
Twin, *n*	10	5	8	1	1 (25.0)	4.18	*ns*
Maternal data							
First born infant, *n*	60 (62.5)	22 (57.9)	27 (64.3)	15 (88.2)	4 (100)	5.05	*ns*
Maternal age, *years*	32.4 (4.5)	32.4 (6.3)	32.1 (4.9)	30.0 (3.4)	28.9 (8.1)	1.13	*ns*
Married and/or cohabiting, *n*	95 (99.0)	37 (97.5)	40 (95.2)	17 (100)	2 (50.0)	2.42	*ns*
Educational level						29.90	***
Low, *n*	9 (9.4)[a]	10 (26.3)[a]	7 (16.7)[a]	1 (5.9)[a]	2 (50.0)		
Medium, *n*	25 (26.0)[a]	21 (55.3)[b]	18 (42.9)[ab]	3 (17.6)[ab]	2 (50.0)		
High, *n*	62 (64.6)[a]	7 (18.4)[b]	17 (40.5)[ab]	13 (76.5)[a]	0 (0.0)		

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

Classes with different characters (a, b, c) significantly differ on the indicated variable, $p<.05$; classes with similar characters do not differ from each other.

[1] Class E-L was excluded from the F and $\chi 2$ difference tests because of the small group size (n = 4).

Qualitative description of Class Extreme distress – Low-quality parenting

Class E-L consisted of only four mothers who reported the highest levels of distress and showed the lowest quality of interactive behavior. Moreover, they all had distorted attachment representations. This class was described qualitatively based on background and interview data, because this may give insight into the risk profiles of these mothers and provide a clinically useful addition to the quantitative results.

All four women gave birth to a preterm infant and in all cases other risk factors were present. The first mother went through a perinatal psychosis. Also, during the interview she reported that she experienced severe partner violence. While the infant was hospitalized,

Child Protection Services were alarmed because her husband had threatened one of the nurses. The second mother was a single mother with a history of depression and anxiety disorders. During the interview she reported that she additionally experienced severe anger management problems. The third mother was single and had no contact with the infant's biological father. She had been diagnosed with borderline personality disorder and a dysthymic disorder, for which she received psychological treatment. The fourth mother was a mother of a twin pair, with a partner who already had a child with a former girlfriend. Mother indicated that her pregnancy was unplanned but wanted, yet her partner had been very unhappy with the pregnancy.

Next to the fact these mothers gave birth to a preterm infant, the situation these mothers found themselves in and/or their history of psychiatric problems could have resulted in very high levels of distress and a poor parenting quality.

DISCUSSION

This study was designed to investigate whether heightened levels of maternal distress after preterm birth place mother-infant dyads at risk for poor parenting. The results first of all confirmed previous findings that mothers of infants born preterm have significantly higher levels of psychological distress in the postpartum period than mothers of infants born at term gestation. Mothers of very preterm infants were particularly overrepresented in Classes H-M, H-H, and E-L, i.e., the classes characterized by the highest distress levels. However, there appeared to be substantial heterogeneity in mothers' emotional responsivity to the event of preterm birth. While heightened levels of maternal psychological distress seem inherent to the situation of preterm birth, as many as 43% of mothers of moderately preterm infants and 63% of mothers of very preterm infants were in Classes L-L and L-H, i.e., the classes with relatively low distress scores.

Interestingly, the classes characterized by high levels of postpartum distress, i.e., Class H-M, H-H, and E-L, contained mothers of wide-ranging parenting quality and, proportionally, most mothers of very preterm infants. At one extreme are mothers in Class H-H, who reported high distress rates and at the same time displayed high-quality parenting. The H-H profile indicates that high levels of maternal distress in the postpartum period do not necessarily place mother-infant dyads at increased risk of poor parenting. For these mothers, their high distress even seemed to encourage maternal involvement. Previously, Borghini et al. (2006) had already shown that parents of high-risk preterm infants, who were emotionally distressed, anxious and worried in the postpartum period, particularly developed a strong bond with their infant. A plausible explanation could be given by the theory of compensatory care (Beckwith & Cohen, 1978), which states that parents may increase caregiving behavior to sick or high-risk infants to attenuate the effects

of hazardous events, such as preterm birth. Another explanation could be derived from Janis' (1958) 'work of worry' theory, which emphasizes the positive value of psychological distress for recovery after surgery. Distress or worry is generally regarded as a discomforting and undesirable state of emotional arousal that prevents adequate functioning in stressful situations (Salmon, 1993). The 'work of worry' principle, however, postulates that anticipatory worrying may enable a person to adjust more adequately to a forthcoming threat. In contrast, alleviation of anxiety could even undermine effective coping. In the case of preterm birth, the experience of negative feelings, however painful, might nevertheless be important to help mothers to become aware of their new motherhood with the reality of having a preterm infant. Given these insights, one could wonder whether the same cut-off thresholds should be employed to determine the presence of maternal postpartum distress in both term and preterm populations, as in regular clinical practice.

Class E-L, on the other hand, shows why extreme levels of distress in new mothers may be of concern to clinicians working with families. This small group of only four mothers distinguished themselves by extremely high distress rates, intrusive interactive behaviors, and distorted infant representations. Apart from preterm childbirth, cumulative risk was indicated in this group by multiple factors, such as psychiatric problems, partner violence, family disruption, and low educational level. These findings once more demonstrate that the cumulative co-occurrence of different risk factors is often associated with disruptions in parenting (Trentacosta et al., 2008).

The other end of the spectrum includes mothers with relatively low levels of postpartum distress. Approximately two-thirds of mothers were classified in the two low distress groups, i.e., Class L-H or Class L-L. Nevertheless, here too, mothers' levels of postpartum distress were non-informative with regard to subsequent parenting quality. While Class L-H was characterized by low distress and high-quality parenting, Class L-L was characterized by low distress and low-quality parenting. Specifically, the behavior of mothers in Class L-L was marked by withdrawal, whereas their infant attachment representations were often disengaged. A substantial proportion (40%) of mothers in this class were mothers of very preterm infants. On the basis of these findings, one could wonder whether a lack of maternal distress in the case of very preterm birth should be considered as potentially worrisome as well. Questionnaires measuring depressive, anxiety, and PTSD symptoms, only have established cut-off thresholds at the high ends of the scales, not at the low ends. Consequently, when a mother reports no or few symptoms of distress, this may impart a false sense of security. Class L-L underlines the importance of remaining vigilant in the interpretation of low distress scores.

These results furthermore lead us to speculate why mothers in Class L-L might be more likely to engage in withdrawn and disengaged parenting. It could be that mothers who exhibit detached behavior have developed an avoidant attachment style themselves, even

before the birth of their infant (Mikulincer & Shaver, 2012). Individuals may develop an avoidant style as a result of early experiences with a caregiver who, for instance, disapproves or punishes closeness and expressions of need or vulnerability (Ainsworth, Blehar, Waters, & Wall, 1978). In contrast to securely attached individuals, who are often raised by a responsive and sensitive caregiver who contributed to a sense of basic trust and confidence that stressful situations can be manageable, insecurely attached individuals are more likely to deal with stressful experiences by deactivating strategies, such as a strong emphasis on self-reliance, inhibition of display of negative emotions, and avoiding closeness and interdependence in relationships. Perhaps mothers in Class L-L avoid closeness with their infant and inhibit negative emotions in the challenging event of (preterm) birth.

In conclusion, the groups with the lowest parenting scores experienced either extreme levels of distress (Class E-L) or, on the contrary, very little distress (Class L-L) in the postpartum period. We hypothesize that a curvilinear association exists between maternal distress and parenting quality after preterm birth. That is, moderate to high levels of distress may result in optimal parenting, while very low or very high distress levels may interfere with a mother's capacity to interact sensitively with her infant and form a balanced attachment representation. This study indicates that heightened maternal distress levels after preterm birth do not necessarily place mother-infant dyads at increased risk for poor parenting, and might even be beneficial. Conversely, low maternal distress levels do not necessarily indicate good-quality parenting and may be non-informative in that regard.

The strengths of the present study include the use of multimethod (observational and interview) measures to evaluate parenting quality and the use of LCA to shed light on the heterogeneity among mothers of infants born preterm. There are also limitations to consider. This is a explorative study on classes of mothers with varying levels of distress and parenting quality after preterm birth. Further research into the generalizability of these findings is therefore needed. The focus was exclusively on the mother-infant relationship. Future research should evaluate how paternal postpartum distress impacts on both maternal and paternal parenting quality. Moreover, further research should consider infant outcomes in relation to the different profiles.

Clinical implications

Many parenting interventions are aimed at reducing postpartum distress in mothers of preterm infants. Results of this study prompt a reconsideration of the association between postpartum distress and parenting quality and challenge the notion that high maternal distress rates are always paralleled by poor parenting practices. Clinicians should realize that the presence of postpartum distress in mothers is not necessarily maladaptive to the mother-infant relationship, whereas the absence of distress does not always guarantee optimal parenting. Further, it is important that they consider heterogeneity in mothers'

emotional responsivity to the event of preterm birth and are aware of other psychosocial and socioeconomic risk factors that mothers bring to their parenting. We suggest a multidimensional screening approach to identify mother-infant dyads in need of support. Screening of psychological distress should not stand alone, but should be complemented by assessment of the mother-infant relationship, so that appropriate psychological and/or parenting intervention can be offered.

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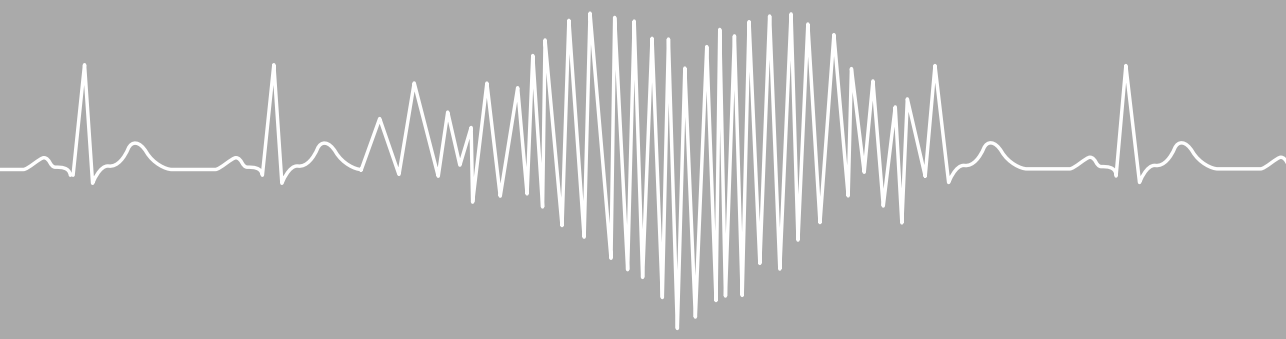
CHAPTER 5

Early predictors of disrupted attachment representations among parents of term and preterm infants



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ABSTRACT

Objective. Parental disrupted attachment representations of the infant have been found to be detrimental to parenting practices and infant mental health. It has been indicated that early identification of parents with highly disrupted representations may lead to improved outcomes, particularly for high-risk groups. The present study therefore aimed to determine predictors of disrupted attachment in parents of term and preterm infants.

Method. Participants were mothers (N = 205) and fathers (N = 189) of term, moderately preterm, and very preterm born infants. Disrupted parental representations were assessed using the Disrupted Scale of the Working Model of the Child Interview (WMCI-D). Recursive partitioning methods, using both random forests and decision trees, were applied to predict disrupted attachment in parents at six months postpartum. Predictor variables were collected at one month postpartum and comprised parental demographics, infant prematurity, parental postpartum experiences and perceptions (CLIP interview), interactive behavior (NICHD observations), quality of bonding (PBQ questionnaire), and psychological distress symptoms (EPDS, STAI, and PPQ questionnaires).

Results. The analyses revealed that, irrespective of prematurity, negative and unrealistic parental perceptions, as well as insensitive and intrusive parental behaviors toward the infant, were predictive of the development of parent-infant disrupted attachment.

Conclusions. Postpartum assessment of parental perceptions and behaviors can help identify parent-infant dyads at risk of parent-infant disrupted attachment.

INTRODUCTION

The key feature of good parenting, according to Bowlby (1969/1988), is the provision of a 'secure base' from which the infant can explore the world and to which the infant can return knowing that it will be "welcomed, nourished physically and emotionally, comforted if distressed, reassured if frightened". Especially sensitive and responsive parental reactions to the infant's signals and behaviors promote the infant's sense of parents' availability as the 'secure haven and secure base' (Ainsworth, Blehar, Waters, & Wall, 1978; De Wolff & Van IJzendoorn, 1997).

The parents' ability to provide sensitive and responsive care to the infant is largely explained by their own attachment representations or working models. Representations are described as a set of tendencies to behave in particular ways in intimate relationships (Zeanah & Smyke, 2009). They provide information about the 'meaning' an infant has to its parents by asking the parents about their experiences with and perceptions of the infant, parenting practices, and relationship with the infant. These internal working models are thought to exert a direct influence on their parenting practices, in both a positive and negative way (Korja et al., 2010; Schechter et al., 2008; Sokolowski, Hans, Bernstein, & Cox, 2007). Particularly *disrupted* representations are found associated with negative parenting (Crawford & Benoit, 2009). Disrupted attachment representations may evolve when a parent suffers from unresolved mourning regarding the past loss of an attachment figure or unresolved traumatic memories (e.g., of childhood abuse or neglect). Parental representations of the infant seem to be guided by parents' representations of the past.

Crawford and Benoit (2009) were the first to focus on disrupted internal parent-infant representations among caregivers. The authors assessed these representations by administering a semi-structured interview (Working Model of the Child Interview: WMCI; Zeanah, Benoit, & Barton, 1986) that was extended with the Disrupted Scale (WMCI-D) to capture disrupted features in parents' narratives. In contrast to organized representations, disorganized or disrupted representations are characterized by elements of parental affective communication errors (e.g., laughing at the infant's distress), role/boundary confusion (e.g., asking the infant for affection), fearfulness/disorientation (e.g., speaking with a frightened/ghostlike voice or speaking of the infant as though inanimate), intrusiveness/negativity toward the infant (e.g., pulling or grabbing the infant), and/or withdrawal from the infant (e.g., dismiss the infant's need for contact). Crawford and Benoit (2009) demonstrated strong associations between caregivers' narratives during the interview and their display of frightened, frightening, or atypical behavior toward the infant in daily interactions, as well as subsequent infant disorganized/disoriented attachment with the caregiver. Since infants with disorganized attachment are at substantial risk for later psychopathology and poor socio-emotional outcomes (Main & Solomon, 1986; Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999) more insight into disorganized parental representations and disorganizing parenting practices is needed.

While it is generally acknowledged that parental representations of the infant draw upon past experiences, it is suggested that characteristics of the infant and the larger caregiving context in which parents find themselves, shape their representations. Although internal representations are consolidated initially in adolescence, the caregiving representational system is thought to be influenced by the parents' transition to parenthood and their interaction with the infant (Solomon & George, 1996). It is proposed that when caregiving situations engender feelings of helplessness (e.g., when parents perceive themselves as unable to protect the infant), this may disorganize caregiving on both behavioral and representational levels (Solomon & George, 1996). Given this notion that parental attachment may reflect parents' present state of mind, as well as their present experiences and perceptions of the infant and their situation, we previously examined whether parental representations of the infant were more often disrupted after preterm childbirth (Hall et al., 2015; Tooten et al., 2014). This is of special interest because preterm birth may constitute a crisis situation for parents evoking strong feelings of distress and helplessness (Holditch-Davis, Bartlett, Blickman, & Miles, 2003). Moreover, interacting with a preterm infant can be very difficult for parents (Miles & Holditch-Davis, 1997; Müller-Nix & Ansermet, 2009).

Our previous studies on parental attachment representations revealed that prematurity of the infant (as measured by their gestational age) is not necessarily associated with disrupted parental representations of the infant (Tooten et al., 2014). In addition, maternal interactive behavior proved to be an important mechanism through which maternal representations influence the development of infant attachment in both term and preterm infants (Hall et al., 2015). In these studies, however, we failed to consider the parents' context of caregiving stressors and did not focus on the identification of meaningful predictors of parental disrupted attachment. Given the detrimental effects of parental disrupted attachment and preterm infants vulnerability to suboptimal parenting (Poehlmann & Fiese, 2001), identification of parents with highly disrupted representations of their infant seems warranted. Early identification of these parents may provide a critical opportunity to intervene in parent-infant dyads at risk, which may lead to improved outcomes for infants and families (Crawford & Benoit, 2009).

The present study extends our previous work by focusing on predictors of disrupted attachment in parents of term and preterm infants. We examine whether predictive variables for high levels of disrupted parental representations (WMCI-D) at six months postpartum can be identified. Recursive partitioning, a very powerful and highly accurate methodology of building decision trees to model predictors, is used to derive a clinical decision rule to identify high-risk subgroups of mothers and fathers based upon variables assessed at one month postpartum. To be of value in clinical practice, we choose to include measures that are frequently used to guide decision-making. Moreover, we only incorporate those variables that have been shown to contribute to problems in the early parent-infant relationship, such as negative postpartum experiences, negative perceptions, adverse behaviors, and psychological distress in parents.

METHOD

Participants and recruitment

This study was part of a larger prospective longitudinal research project among parents of term and preterm infants (Tooten et al., 2012). The study protocol received ethical approval by the Medical Ethical Committee of the Catharina Hospital in Eindhoven, The Netherlands. In addition, local feasibility approval was granted from the eight participating hospitals.

Both mothers (N = 205) and fathers (N = 189) of term (n = 75), moderately preterm (n = 66), and very preterm born infants (n = 64) participated in the present study. Parents of term infants (≥ 37 weeks of gestational age (GA)) and of moderately preterm infants (≥ 32 - 37 weeks GA) were recruited from eight maternity wards, while parents of very preterm infants (< 32 weeks GA) were recruited from two Neonatal Intensive Care Units (NICUs). Pre-selection criteria were a hospital delivery and parents having sufficient understanding of the Dutch language. Eligible parents were invited to participate, either before the delivery or within 24 hours after birth. It was emphasized that participation was voluntary, without financial compensation and that one was free to withdraw from the study at any time, with no consequences for treatment of their infant. Written informed consent was obtained from all participating parents after the nature of the study and the procedures had been fully explained to them. Parental demographic and infant medical characteristics are presented per GA group in Table 5.1.

Measures

The multi-source data available for the prediction of parental disrupted attachment representations at six months postpartum (WMCI-D) comprised maternal and paternal interview data, observational data, and self-report data collected at one month postpartum. The predictor variables included parental demographics, infant prematurity, parental postpartum experiences and perceptions (CLIP interview), psychological distress symptoms (EPDS, STAI, and PPQ questionnaires), interactive behavior (NICHD observations), and quality of bonding (PBQ questionnaire), see Figure 5.1.

Parental disrupted attachment representations

The *Disrupted scale* of the *Working Model of the Child Interview* (WMCI-D; Crawford & Benoit, 2009) was used to assess disrupted parental attachment representations. The WMCI is a 45-60 min. semi-structured interview that elicits and classifies parental perceptions of and subjective experiences with the personality characteristics and behavior of the infant, as well as the relationship with the infant (Zeanah, Benoit, & Barton, 1986). The recently developed WMCI-Disrupted scale extends the original WMCI by capturing disrupted features in parental narratives. Whilst the three original WMCI classifications, i.e., balanced, disengaged, and distorted, were found concordant with the infant classifications balanced/

Table 5.1 Infant birth data and parental demographic characteristics of study participants

	T-Group	MP-Group	VP-Group	Total	Difference [1]
Infant medical data, *n*	**75**	**66**	**64**	**205**	-
Male sex, %	50.7	56.1	48.4	51.2	ns
Twin, %	4.0	18.2	18.8	13.2	a,b
GA at birth, *weeks*	39.5 (1.4)	34.6 (1.3)	29.5 (1.8)	34.8 (4.4)	a,b,c
GA at birth, *range*	37 - 42	32 - 37	25 - 32	25 - 42	-
Birth weight, *grams*	3447 (503)	2337 (562)	1304 (367)	2410 (1006)	a,b,c
Birth weight, *range*	2030 - 4865	1220 - 4280	592 - 2220	592 - 4865	-
5-min APGAR	9.6 (0.7)	9.2 (1.2)	7.8 (1.5)	8.9 (1.4)	a,b,c
Hospital stay, *days*	2.7 (2.3)	17.9 (10.7)	61.7 (27.2)	25.8 (29.6)	a,b,c
Maternal demographics, *n*	**75**	**66**	**64**	**205**	-
Nationality Dutch, %	92.0	95.5	95.3	94.1	ns
Educational level [2]	2.6 (0.7)	2.3 (0.7)	2.2 (0.7)	2.4 (0.7)	a,b
First time parent, %	49.3	74.2	78.1	66.3	a,b
Paternal demographics, *n*	**71**	**62**	**56**	**189**	-
Nationality Dutch, %	95.8	95.2	92.9	94.7	ns
Educational level [2]	2.4 (0.8)	2.3 (0.8)	2.1 (0.8)	2.3 (0.8)	b
First time parent, %	50.7	69.4	73.2	63.5	a,b
Single/divorced parents, *%*	2.7	1.5	7.8	3.9	ns

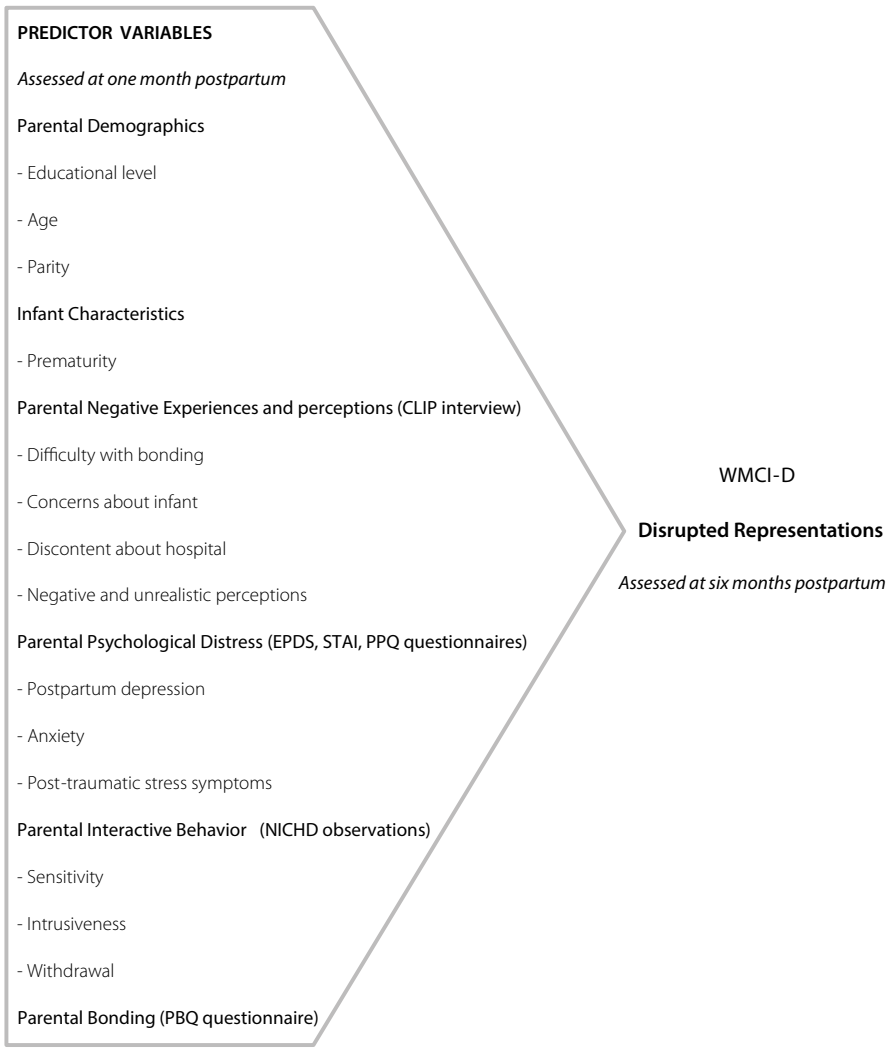
Note. Values are expressed as means (SD) unless otherwise indicated.
T = Term infants, MP = Moderately Preterm infants, VP = Very Preterm infants.
[1] Study participants were compared using t-tests for continuous variables and chi square analyses for categorical variables. ns = a non-significant difference between groups; a = term group differs from moderate preterm group, $p<.05$; b = term group differs from very preterm group, $p<.05$; c = moderate preterm group differs from very preterm group, $p<.05$.
[2] Educational level was classified as low (1) corresponding with primary education, medium (2) corresponding with junior vocational training, and high (3) corresponding with senior vocational or academic training.

secure, disengaged/avoidant, and distorted/resistant on the Strange Situation (Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994), the WMCI-D identifies those aspects of parental representations that are linked with disorganized infant attachment (Crawford & Benoit, 2009; Tooten et al., 2014).

Parents' representations can be classified as disrupted when parents describe disrupted behaviors toward the infant (interview content) or when they convey their narrative in a disrupted way (interview process/discourse). For instance, a parent can describe a situation in which the infant gets hurt because he or she failed to respond to protect the infant (interview content). Or the parents may laugh during the interview when describing the infant's distress in that specific situation (interview process/discourse). The WMCI-D consists of five dimensions: affective communication errors, role/boundary confusion, fearfulness/disorientation, intrusiveness/negativity, and withdrawal. Each dimension is scored on a

7-point global rating scale, which collectively form a total WMCI-D score of 1 (not disrupted) to 7 (severely disrupted attachment representations). Important to note, the frequency of the described behaviors is not necessarily in agreement with the overall rating. The total score is strongly determined by the severity of the described behaviors and disorientations. More weight is given to disrupted behaviors that occur while the infant is distressed or if the pattern of parental behavior is bizarre, chaotic, or difficult to predict. The clinical cut-off threshold of the WMCI-D is 5. Parents who have no or mild disrupted representations receive a score of 1-4, while parents with clear signs of disrupted representations are assigned a score of 5-7.

Figure 5.1 Predictor variables



The interviews were conducted by one of the researchers (HH, RH, or AT) at the family's home. Mothers and fathers were interviewed separately. The narratives were videotaped and subsequently coded by one of the researchers, who received training by one of the developers of the interview (D. Benoit) and proved to be reliable on the WMCI-D reliability test (≥80 %). To assess the level of agreement between raters, 40 interviews were randomly selected and double-coded. The intraclass correlation coefficients (ICCs) for the dimensions ranged from .75 to .96 for mothers and from .87 to .92 for fathers.

Parental negative experiences and perceptions

The *Clinical Interview for Parents of High-Risk Infants* (CLIP; Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993) was used to assess negative parental experiences and perceptions of birth-related stressors. The CLIP is a 45-60 min. semi-structured interview that provides a multidimensional profile of parental experiences and perceptions related to the pregnancy, delivery, infant, hospitalization, support system, and their narratives. The interview is a potentially useful instrument to identify parents in psychological need (Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993; Keren et al., 2003).

These interviews with mothers and fathers were conducted separately by one of the researchers (HH, RH, or AT), in a private setting in the hospital or at the participant's home. Parents' narratives were videotaped and subsequently coded by one of the researchers, using a coding scheme developed by Keren et al. (2003). Our previous study on the factor structure of the CLIP revealed that it contains four mutually independent factors (Hoffenkamp et al., 2015): (1) facing difficulties in parent-infant bonding (Factor 1: difficulty with bonding, range = 5-17), (2) concerns about the infant's health and development (Factor 2: concerns about infant, range = 4-13), (3) discontentment about the hospital care (Factor 3: discontent about hospital, range = 3-9), and (4) negative and unrealistic perceptions regarding the infant and the situation (Factor 4: negative perceptions, range = 6-18). Higher scores on the CLIP factors indicate more negative experiences, negative perceptions, and areas of concern as identified by the parent. To evaluate the inter-rater reliability of the instrument, 30 interviews were randomly selected and double coded. The ICC values ranged from .83 to .97 for mothers and from 76. to .99 for fathers.

Parental psychological distress

The 14-item *Perinatal Posttraumatic Stress Disorder Questionnaire (*PPQ; Quinnell & Hynan, 1999*)* was used to measure early parental PTSD symptomology. Items have a dichotomous answer format (yes/no; sum-score range = 0-14), with higher scores reflecting more PTSD symptoms.

The 10-item *Edinburgh Postnatal Depression Scale* (EPDS; Cox, Holden, & Sagovsky, 1987) was applied to assess symptoms of postpartum depression. Items were rated on 4-point Likert scales, with higher scores indicating more depressive symptoms (sum-score range = 0-30). The 20-item *State-Trait Anxiety Inventory* (STAI-State; Spielberger, Gorsuch, Lushene, Vagg, &

Jacobs, 1983) was used to assess levels of state-anxiety. Items were rated on 4-point Likert scales with higher scores indicating higher levels of anxiety (sum-score range = 20-80).

These questionnaires are reliable and well-validated measures to assess psychological distress in the postpartum period (Callahan & Hynan, 2002; Tendais, Costa, Conde, & Figueiredo, 2014). The internal consistency estimates in the present sample were good to very good for the PPQ (mothers: α = .78, fathers: α = .73), EPDS (mothers: α = .86, fathers: α = .80), and STAI-State (mothers: α = .94, fathers: α = .92).

Parental interactive behavior

Parental interactive behavior was assessed using 15-min video recordings capturing behavioral observations of daily dyadic parent-infant interaction. The interactions were videotaped in the hospital or at the participants' home, during daily moments of caregiving (e.g., bathing, changing diapers, feeding or touching, holding, and vocalizing to the infant in case of a very preterm infant). Parents' verbal and nonverbal behaviors were rated by means of a coding manual (labeled *NICHD coding manual*) developed by the U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Child Health and Human Development Early Care Research Network (1999). Minor adaptations were made to the original instrument to make it applicable to our population of parents with preterm infants. Ratings were made on six global rating items on a 4-point scale, and subsequently clustered into three composite scores. The items 'sensitivity to non-distress' and 'positive regard for the infant' together measured parental sensitivity. The items 'intrusiveness' and 'negative regard for the infant' measured parental intrusiveness. The items 'detachment' and 'flatness of affect' measured parental withdrawal. All composite scores for parental interactive behavior ranged from very uncharacteristic to very characteristic interactive behavior on a 7-point scale (range = 1-7).

The videotapes were scored by independent coders. Prior to scoring, the coders received standardized training for reliability, along with regularly scheduled supervision during the process of coding. To evaluate the inter-rater reliability of the instrument, 30 videos were randomly selected and double coded. The ICC values ranged from .67 to .78 for mothers and from 64. to .73 for fathers.

Parental bonding

The 25-item *Postpartum Bonding Questionnaire* (PBQ; Brockington, 2001) was used to assess parental bonding. This instrument was designed to diagnose early disorders in the parent-infant relationship and comprises the subscales: impaired bonding, rejection and anger, infant focused anxiety, and incipient abuse. A sum-score is used in the present study (range = 0-125). High scores are indicative of serious parental problems in bonding with the infant. The internal consistency estimates in the present sample were good (mothers: α = .77, fathers: α = .82).

Data analyses

Recursive partitioning analyses were performed to determine risk factors that are associated with maternal and paternal disrupted attachment representations of the infant at six months postpartum. The parents in our sample were therefore repeatedly subdivided on the basis of multiple predictor variables collected at one month postpartum (Figure 5.1).

Recursive partitioning (see e.g., Strobl, Malley, & Tutz, 2009) is a statistical method for multivariable analysis that aims to find the predictor variables and associated cutoff points that provide the greatest separation in the outcome of interest. The method is often used for nonparametric regression and classification and is an important tool for data mining. The algorithm splits data recursively into smaller and more homogeneous subsets to group the data into those with and without the outcome in question. At each step, the best split of the data is defined as the one that results in the greatest reduction of impurity. The resultant model is referred to as a 'tree-based model' because recursive partitioning creates a classification or decision tree that classifies individuals based on the input variables.

An unwanted side effect of the recursive partitioning approach is the high variability in the prediction of single trees. Because single trees can be very sensitive to perturbations, even small changes in the data may result in an entirely different tree structure. A solution to this instability problem is to reduce variance by averaging over multiple trees. Random forests (Breiman, 2001) is such an ensemble classifier consisting of a set (or 'forest') of classification trees. These random forests are built by fitting hundreds of classification trees. Each tree is derived from a bootstrap sample of the data, with a random subset of predictors considered at each node. The primary advantages are that random forests are (1) able to model large numbers of predictor variables simultaneously even in the presence of complex interactions, (2) have a high predictive accuracy, (3) provide individual measures of variable importance, (4) make few assumptions about the data, and (5) can be used to identify salient combinations of risk factors. Moreover, because the numerical results can be presented in a graphical form, the final classification tree can provide easy to visualize decision rules which are easily interpretable by clinicians.

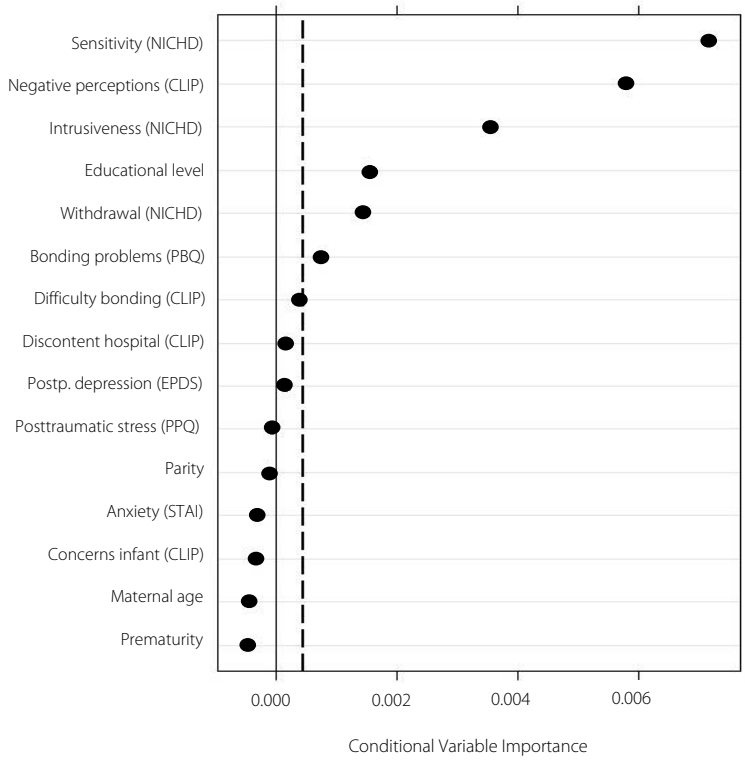
In the present study, the random forests method was used to study variable importance and select the most relevant predictor variables associated with maternal and paternal disrupted representations. For the analyses 2500 trees were generated with three variables randomly selected for evaluation at each node. Subsequently, decision trees were generated for both mothers and fathers to identify markers for disrupted representations, as well as their optimal thresholds for predicting parents at risk. To construct 'near-optimal representative decision trees', the classification trees were built on the smaller set of predictors identified by the random forests. The analyses were conducted using R statistical software (http://www.r-project.org/), whereby the random forests were generated with the cforest function (Strobl, Boulesteix, Kneib, Augustin, & Zeileis, 2008) and the decision trees were

built with the ctree function (Hothorn, Hornik, & Zeileis, 2006) from the party package in R. Parents' representations were investigated as a binary outcome, i.e., 'disrupted' or 'not-disrupted'. Missing data in the predictor variables were handled using multiple imputation. In case of twins, only outcomes regarding the firstborn infant were included in the analyses.

RESULTS

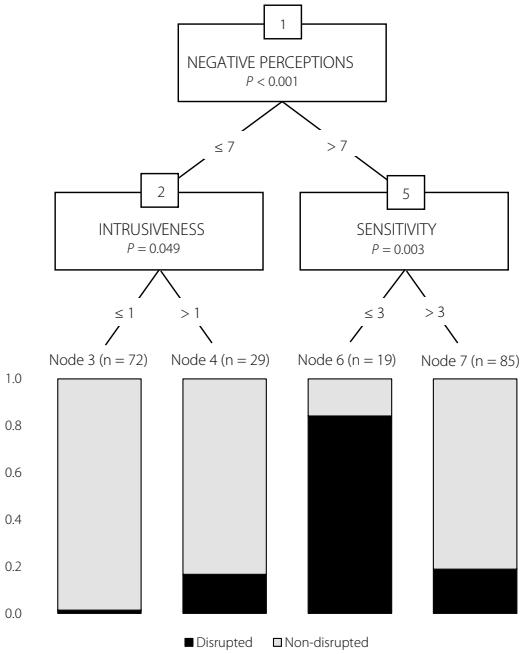
Mothers. Approximately 23.4% (n = 48) of the mothers in our study sample were classified as having disrupted representations (WMCI-D ≥5) of their infant at six months postpartum. Maternal interactive behavior (NICHD observations of insensitivity, intrusiveness, and withdrawal), negative and unrealistic maternal perceptions (CLIP interview), mother-infant bonding problems (PBQ questionnaire), and low maternal education were revealed by the random forest as the most important predictors of disrupted representations for mothers (see Figure 5.2a).

Figure 5.2a Random forest predicting maternal disrupted representations.



The resulting clinical decision tree (see Figure 5.3a) first splits up the sample according to negative maternal perceptions: A score higher than 7 is strongly associated with having a disrupted representation. Within each partition or branch, a second split occurs. The higher risk partition is further split up according to sensitivity: A score lower or equal to 3 (for those who score higher than 7 on negative perceptions) is strongly associated with having a disrupted representation. The lower risk partition is further split up according to intrusiveness: A score higher than 1 (for those who score lower or equal to 7 on negative perceptions) is more strongly associated with having a disrupted representation. Mothers' classification tree yields a sensitivity of 33.3% and a specificity of 98.1%.

Figure 5.3a Decision tree for predicting disrupted attachment representations (WMCI-D) in mothers (N = 205).



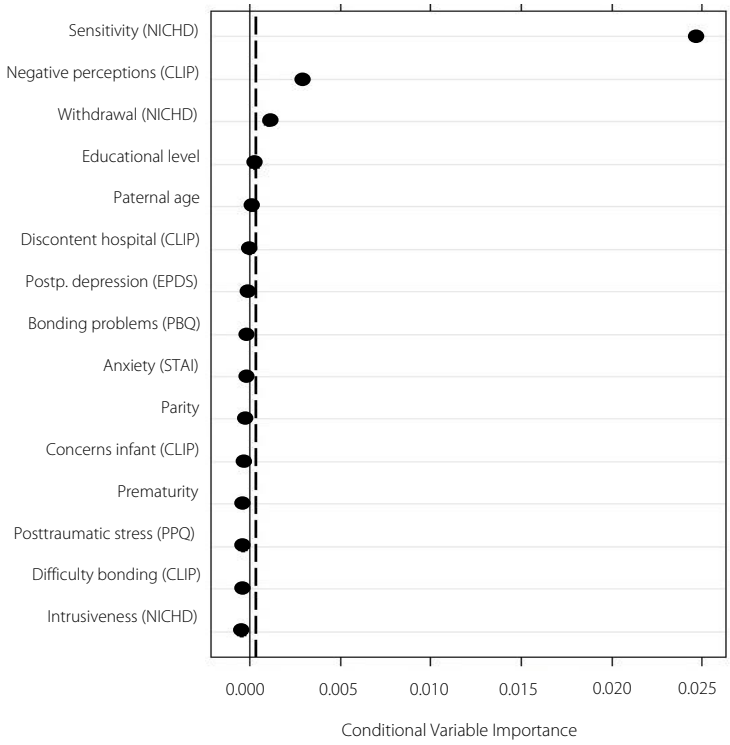
Note. The columns filled in black represent mothers with disrupted representations, those filled in gray represent mothers with non-disrupted representation of their infant.

The decision tree yields four risk profiles of mothers: a *very-low risk group* (node 3: n = 72, 1 disrupted case, 1.4% probability of a disrupted case), a *low-medium risk group* (node 4: n = 29, 5 disrupted cases, 17.2% probability of a disrupted case), a *medium risk group* (node 7: n = 85, 16 disrupted cases, 30.6% probability of a disrupted case), and a *high risk group* (node 6: n = 19, 16 disrupted cases, 84.2% probability of a disrupted case). Hence, mothers in the highest risk group (determined by negative perceptions > 7 and sensitivity ≤ 3) have

a 84.2% probability of disrupted representations, while mothers in the lowest risk group (determined by negative perceptions ≤ 7 and intrusiveness ≤ 1) only have a 1.4% probability of disrupted representations at six months postpartum.

Fathers. Approximately 22.8% (n = 43) of the fathers in our study sample were classified as having disrupted representations (WMCI-D ≥5) of their infant at six months postpartum. The random forest revealed that paternal interactive behavior (NICHD observations of insensitivity and withdrawal) and negative and unrealistic paternal perceptions (CLIP interview) were the most important predictors of disrupted representations for fathers (see Figure 5.2b).

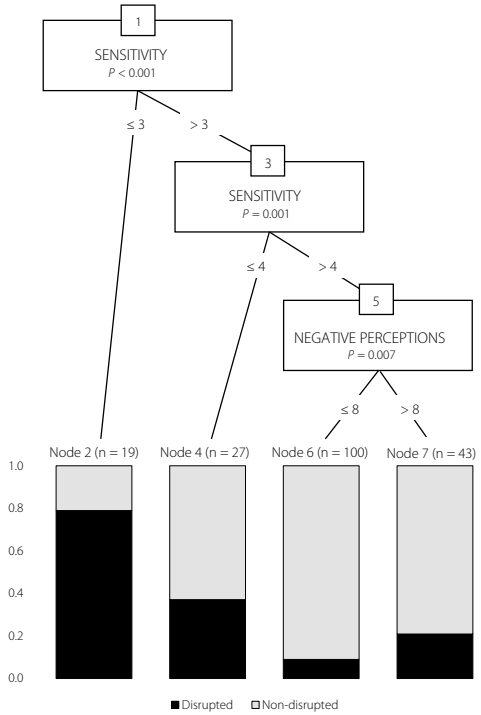
Figure 5.2b Random forest predicting paternal disrupted representations.



The resulting clinical decision tree (see Figure 5.3b) first splits up the sample according to paternal sensitivity: A score lower or equal to 3 is strongly associated with having a disrupted representation, whereas a score higher than 3 leads to a second split. This partition is further split up on the basis of paternal sensitivity: A score lower or equal to 4 is moderately

associated with having a disrupted representation, whereas a sensitivity score higher than 4 leads to a third split based on paternal negative perceptions: A score higher than 8 on negative perceptions is more strongly associated with having a disrupted representation. Fathers' classification tree yields a sensitivity of 34.9% and a specificity of 97.3%.

Figure 5.3b Decision tree for predicting disrupted attachment representations (WMCI-D) in fathers (N = 189).



Note. The columns filled in black represent fathers with disrupted representations, those filled in gray represent fathers with non-disrupted representation of their infant.

The decision tree yields four risk profiles of fathers: a *low risk group* (node 6: n = 100, 9 disrupted cases, 9.0% probability of a disrupted case), a *low-medium risk group* (node 7: n = 43, 9 disrupted cases, 20.9% probability of a disrupted case), a *medium risk group* (node 4: n = 27, 10 disrupted cases, 37.0% probability of a disrupted case), and a *high risk group* (node 2: n = 19, 15 disrupted cases, 78.9% probability of a disrupted case). Hence, fathers in the highest risk group (determined by sensitivity ≤ 3) have a 78.9% probability of disrupted representations, while fathers in the lowest risk group (determined by sensitivity > 4 and negative perceptions ≤ 8) only have a 9.0% probability of disrupted representations at six months postpartum.

DISCUSSION

This study aimed to identify early predictors of disrupted attachment (WMCI-Disrupted scale) in mothers and fathers of term and preterm infants, based on variables that have been shown to contribute to problems in the parent-infant relationship. Recursive partitioning methods were applied to define prognostic groups of parent-infant dyads at risk. Our tree-based models identified distinct risk profiles associated with a greater probability of parental disrupted representations.

The results revealed that particularly the presence of negative and unrealistic parental perceptions regarding the infant and the situation (as measured by CLIP interview responses) and the display of insensitive and intrusive parental interactive behaviors (as measured by NICHD observations of parent-infant interactions) are associated with a greater probability of parent-infant disrupted attachment. Interestingly, none of the prematurity-related stressors, such as immaturity of the infant, negative parental postpartum experiences, concerns about the infant's health and development, and psychological distress after birth (postpartum depression, anxiety, and post-traumatic stress) were associated with the development of parental disrupted representations of the infant. Hence, not preterm birth, but rather the presence of parental negativity, distortions, and adverse behaviors seems to be predictive of later disruptions in parent-infant attachment.

Our findings on the importance of parental negative perceptions and adverse behavior are consistent with previous studies on parent-infant dyads at risk of (extremely) poor parenting. For instance, studies on the determinants of child maltreatment demonstrated that the cumulative risk of child maltreatment is strongly related to negative parental perceptions and unrealistic expectations (MacKenzie, Kotch, & Lee, 2011). High-risk parents are often marked by low levels of social support, negative parental attributions and perceptions of the infant's characteristics and behavior, and unrealistic expectations regarding the infant's development (Azar, 2002; MacKenzie, Kotch, & Lee, 2011). This is in line with our measure of parental negative perceptions. As explained in our previous study on the CLIP (Hoffenkamp et al., 2015), parents who score high on the 'negative perceptions' measure are largely characterized by their unrealistic expectations regarding the infant's development, low levels of perceived social support, an initial negative reaction to the pregnancy, and features of disorganization in their narratives. Furthermore, prior studies provided ample evidence that extremely insensitive and frightening parental behavior plays an important role in the emergence of infant disorganized attachment (Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). The current findings add to a growing body of literature demonstrating that early parental negativity, distortions, and insensitivity, can be regarded as a potential threat to the parent-infant relationship.

In addition, the present study provides some useful guidance for clinicians working with families. The proposed decision trees may help to identify which factors determine

the risk of parent-infant disrupted attachment. Moreover, the distinctive risk profiles may help to identify parents at high risk and may be helpful when deciding if supplementary examination is needed for identification of parent-infant dyads in need of support. It is, however, important that clinicians remain vigilant with respect to the use of this decision tool, in particular because the 33.3% - 34.9% sensitivity of the instrument is somewhat low for a screening measure.

The combination of a rather low sensitivity (33.3% - 34.9%) and high specificity (97.1% - 98.1%) of mothers' and fathers' decision tree indicates that it is relatively easy to recognize parents with non-disrupted representations, but quite difficult to identify parents with disrupted representations of their infant. Features of disrupted parent-infant attachment, such as parental affective communication errors and disorientation, can be quite difficult to observe by others because of their complex and subtle nature. It has consequently been proposed to use advanced observational instruments such as the AMBIANCE to identify parents with disrupted representations of their infant (Crawford & Benoit, 2009). While we agree that such a measure specifically designed to code parental disrupted behaviors probably yields the best predictive performance, we feel that information about the predictive value of simple and frequently used measures is particularly helpful to guide decision-making in practice.

It is important to note that, although this study provides important insights into predictors of disrupted attachment representations in parents, the evidence is exploratory in nature. The results should, therefore, be considered as being suggestive rather than conclusive. Further validation and replication in other samples is needed to confirm our findings.

Clinical implications

The results of the study suggest that interviews and observations may be better screening methods than questionnaires to identify parent-infant dyads at risk of parent-infant disrupted attachment. It is indicated that the combined assessment of parental perceptions and interactive behaviors may help to identify parents at risk of disrupted representations after both term and preterm birth. The distinct risk-profiles that were distinguished may help clinicians decide when supplementary examination is needed for identification of parent-infant dyads in need of support.

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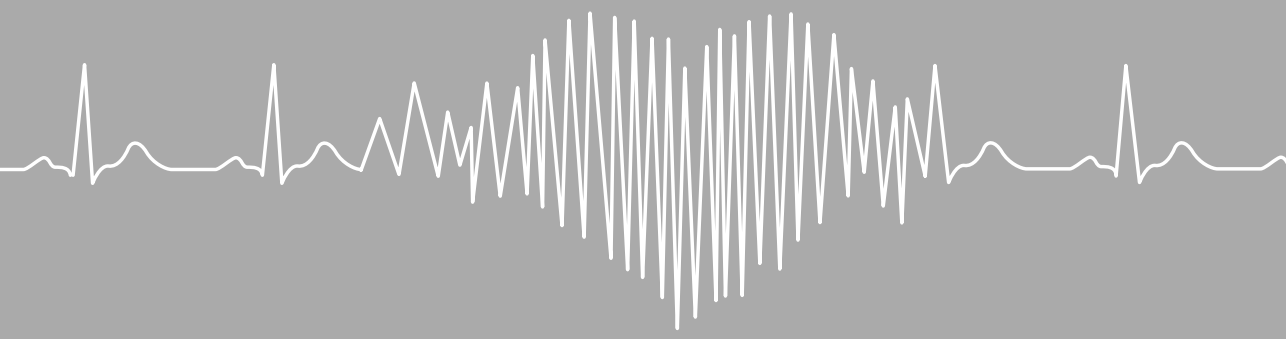
CHAPTER 6

Effectiveness of hospital-based Video Interaction Guidance on parental interactive behavior, bonding, and stress after preterm birth: A randomized controlled trial



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ABSTRACT

Objective. This study examined the effectiveness of hospital-based Video Interaction Guidance (VIG) for mothers and fathers of infants born preterm (25-37 weeks of gestation).

Method. VIG is a preventive video-feedback intervention to support the parent-infant relationship. One-hundred-and-fifty families (N = 150 infants, 150 mothers, 144 fathers) participated in a pragmatic randomized controlled trial to evaluate the effects of VIG as adjunct to standard hospital care. Primary outcome was parental interactive behavior (sensitivity, intrusiveness, and withdrawal) as observed in videotaped dyadic parent-infant interaction. Secondary outcomes comprised parental bonding, stress responses, and psychological wellbeing based on self-report. The intervention effects were assessed at baseline, mid-intervention, 3-week, 3-month, and 6-month follow-ups. Data were analyzed on an intention-to-treat basis, using multilevel modeling and analyses of covariance.

Results. VIG proved to be effective in enhancing sensitive behavior and diminishing withdrawn behavior in mothers (Cohen's *d*, range: .24 - .44) and in fathers (*d* range: .54 - .60). The positive effects of VIG were particularly found in mothers who experienced the preterm birth as very traumatic (*d* range: .80 - 1.04). The intervention, however, did not change parents' intrusive behavior. Analyses additionally revealed positive effects on parental bonding, especially for fathers, yet no significant effects on stress and wellbeing were detected.

Conclusions. The results indicate that VIG is a useful addition to standard hospital care, reducing the possible negative impact of preterm birth on the parent-infant relationship. VIG appeared particularly beneficial for fathers, and for mothers with traumatic birth experiences. High levels of parental intrusiveness, however, need complementary intervention.

INTRODUCTION

Preterm childbirth is a major public health issue, as it is a leading cause of neonatal mortality and morbidity and incidence rates continue to rise around the world (March of Dimes, PMNCH, Save the Children, & WHO, 2012). Due to advances in perinatal and neonatal care, infants with short gestations have an increasingly good chance of survival in developed countries. Yet these infants born at the threshold of viability are at risk for a variety of health problems, as well as for cognitive and socio-emotional difficulties. Consequently, there is a growing concern for the impact of preterm birth on infants, parents, and public health care systems (McCormick, Litt, Smith, & Zupancic, 2011).

Preterm birth can be a very traumatic event, posing challenges to the infant as well as the parents (Karatzias, Chouliara, Maxton, Freer, & Power, 2007). For infants, the impact of the preterm birth is determined by several interrelated biological and psychosocial factors. First, the health status of the infant critically influences the infant's survival chances, developmental outcomes and future quality of life. In addition, parents' limited abilities to cope with preterm childbirth and their responses to the infant's needs, affect the infant's capabilities and development (Maroney, 2003). For parents, the stressors that are particularly related to preterm birth include the infant's physical condition, early separation from the infant, uncertainty about the infant's outcome, and anticipated loss (Goldberg & DiVitto, 2002). Several studies have shown that these stressors can lead to feelings of anxiety, depression, frustration, distress, and even symptoms of traumatization in parents (Obeidat, Bond, & Callister, 2009; Müller-Nix & Ansermet, 2009). As thoughts and feelings shape behavior, these intense emotions in their turn can affect the process of parental bonding, the establishment of an affectionate parent-infant relationship (Flacking et al., 2012), and consequently the parents' interaction style (Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Müller-Nix, 2011). More specifically, the event of preterm birth can cause some parents to turn away from their infant (i.e., withdrawn interactive behavior) or, alternatively, to overstimulate their infant in an attempt to receive a reassuring response (i.e., intrusive interactive behavior) (Davis, 2003).

To prevent future problems in the parent-preterm infant relationship, attention should be directed toward early parenting behaviors and the role of the parent during hospitalization of the infant. Provision of sensitive parental care and handling while the infant is in hospital is deemed important for the preterm infant's well-being and development, particularly because of the immaturity, vulnerability, and sympathetic arousal of preterm infants (Kinney, 2006; Van den Berg, 2008). Moreover, the quality of early parenting is considered to be a significant mediating factor between the infant's perinatal risk status and developmental outcomes (Forcada-Guex, Pierrehumbert, Borghini, Moessinger, & Müller-Nix, 2006; Singer et al., 2003). This applies to parents of very preterm and moderately preterm infants, because moderately preterms also account for a substantial proportion of hospital admissions, and both

populations are at increased risk of neonatal morbidity (Engle, Tomashek, & Wallman, 2007).

Most hospitals in industrialized countries provide high-quality family centered care to prevent negative outcomes in the parent-preterm infant relationship, in particular for high-risk families. During the infant's hospitalization, the parent-infant relationship is supported by means of standard care options such as kangaroo care (skin-to-skin contact), and additional interventions like Video Interaction Guidance (VIG; Eliëns, 2010; Kennedy, Landor, & Todd, 2011). Hospital-based VIG is a short-term, nonintrusive, behaviorally focused, preventive video-feedback intervention, which aims to facilitate parental bonding, attuned parental interactive behavior and well-being in parents at an early stage, using edited video recordings of parent-infant interactions (Eliëns, 2010; Kennedy, Landor, & Todd, 2011). From an attachment perspective it is suggested that there is a unique salience about the early developmental period for an intervention that supports parental responsiveness behaviors such as warm sensitivity and positive affect in parents with biologically at-risk infants (Landry, Smith, Swank, & Guttentag, 2008). However, the effectiveness of VIG has not yet been empirically evaluated among parents of preterms.

Promising effects have been reported in earlier studies evaluating video-feedback interventions. Bakermans-Kranenburg, van IJzendoorn, and Juffer (2003) showed that behaviorally focused programs with a relatively short duration (i.e., less than five sessions) are especially effective in promoting parental sensitivity. Moreover, in particular interventions that make use of video-feedback are successful in changing parental behavior in both high- and low-risk families with young children (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003; Fukkink, 2008). The meta-analysis of Fukkink (2008) revealed positive effects of video feedback interventions on the quality of parent-infant interactions, parental attitudes, as well as on infant development. The author concluded that video-feedback interventions that were primarily focused on parenting behavior were as effective as interventions focusing on both behavior and mental representations in parents. Delayed video feedback (with selection of edited images and careful preparation of the presentation and discussion) proved to be the most appropriate technique in clinical settings.

The present study is the first to empirically evaluate the effectiveness of hospital-based VIG in parents, that is, mothers and fathers, with moderately and very preterm infants, using a pragmatic, multicenter, Randomized Controlled Trial (RCT) design. Compared with other video-feedback interventions, the main assets of hospital-based VIG are the early timing of the intervention (at the start of the parent-infant relationship), the relatively short duration with a small number of sessions, and the use of edited recordings to provide feedback. We thus hypothesized that VIG in the first week after birth would prevent adverse parental interactive behavior, enhance parental bonding, and diminish parental psychological stress responses. In addition, we focused on a subset of mothers who perceived the preterm birth as a traumatic event, because earlier studies have suggested that maternal

traumatic birth experiences can interfere with a mother's ability to recognize, read, and sensitively respond to the behavioral cues of her newborn (Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex, & Ansermet, 2003; Muller-Nix et al., 2004; Shaw et al., 2006; Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Müller-Nix, 2011). We anticipated that these mothers in particular would benefit from a supportive intervention that focuses on positive parent-infant communication by encouraging parental awareness of and responsiveness to infant cues and behavior.

METHOD

This study is part of a larger longitudinal research project on parents with preterm infants, conducted between September, 2009 and September, 2012 (Tooten et al., 2012). The primary aim of the study was to prospectively evaluate the effectiveness of hospital-based VIG in parents of preterm infants by means of a pragmatic, multicenter RCT design with two parallel arms (Dutch Trial Registration No.: NL24021.060.08). The study protocol received ethical approval by the Medical Ethical Committee of the Catharina Hospital in Eindhoven, the Netherlands. In addition, local feasibility approval was obtained from all participating hospitals.

Recruitment and screening procedure

In seven hospitals in the Netherlands, couples with an infant born preterm (born at less than 37 weeks of gestational age (GA), were invited to participate in the study. Parents with moderately preterm infants (≥32 - <37 weeks GA) were recruited from seven maternity wards and parents with very preterm infants (<32 weeks GA) were approached at two neonatal intensive care units (NICUs). Parents were eligible to participate if they had had a preterm hospital delivery. A poor understanding of the Dutch language and previous experience with a video-feedback intervention were exclusion criteria. Written informed consent was obtained from all parents enrolled in the study. Eligible parents were invited personally by nurses to participate before the delivery or within 24 hr after birth. Parents were informed about the design and aims of the study with an information brochure. It was emphasized that participation was voluntary, without any financial compensation, and that they were free to withdraw from the study at any time. Informed consent was obtained from both parents, before allocation to the intervention or control group.

Allocation strategy and treatment conditions

The participating families (i.e., mother, father, and infant) were randomly assigned in a 1:1 ratio to either the intervention group or the control group using computerized random numbers. The pre-specified allocation sequence was concealed from the nurses involved in

participant enrollment. Randomization was stratified by hospital and GA (<32 weeks or ≥32 - <37 weeks) to ensure balance by region and degree of the infant's prematurity. After parents gave their informed consent, a VIG nurse opened one of the sequentially numbered, sealed envelopes to reveal the treatment assignment.

Standard hospital care

All participating families received standard hospital care. All Dutch hospitals offer comparable high-quality individualized family-centered developmental standard care, and cater for a population of similar social class. The Dutch guidelines regarding perinatal care after preterm birth (2010) recommend compassionate family centered care at <24 weeks GA, and active care at >24 weeks GA. In both intensive care and medium care units, parent visitation is permitted 24 hr a day. Obviously, for very prematurely born infants, the hospital care is more intensive and more closely monitored, compared with care for moderately preterm infants. The development of a positive and affectionate parent-infant relationship is actively promoted and supported. Parents are encouraged to be actively involved in the daily care of their infant. Parents are not only frequently informed about the health status and medical progress of their infant, but also about their infant's signals and responsiveness. The developmentally supportive hospital care involves several standard options, such as kangaroo care, lactation consultations, and psychological support for parents.

The intervention: Video Interaction Guidance

VIG is a short term, nonintrusive, behaviorally focused, preventive video-feedback intervention that guides parents to reflect on their own successful interactions. The basic assumption is that every newborn, even if he or she is born (very) preterm, seeks contact with the parent. Video recordings of parent-infant interaction and the feedback from a VIG professional provide an opportunity for parents to observe, analyze and discuss the infant's behavior and contact initiatives (Eliëns, 2010; Kennedy, Landor, & Todd, 2011). The intervention aims to facilitate parental bonding, to enhance the quality of parental interactive behavior, and to promote parental well-being using edited video recordings of parent-infant interactions (Eliëns, 2010; Kennedy, 2011). Two core concepts are at the basis of VIG (Biemans, 1990): (a) *intersubjectivity,* which refers to a two-way interactional process between parent and infant because attuned and sensitive interactions are essential for a harmonious and responsive relationship (Murray & Trevarthen, 1985) and (b) *mediated learning*, which refers to the guided process of video reviewing during which parents receive positive feedback on their intuitive parenting behaviors (Papoušek & Papoušek, 1987; Bandura, 1977).

VIG in the clinical setting is performed by certified professionals (i.e., trained nurses and pedagogic workers), who work according to a standardized protocol when (a) video-

recording parent-infant interaction, (b) editing the recordings, and (c) reviewing the edited recordings with parents (Eliëns & Prinsen, 2008). The video recordings of approximately 15 min duration are made during daily moments of caretaking (e.g., bathing, changing, and feeding). The interaction guider strives to record spontaneous and natural elements of basic parent-infant communication, with special attention to eye contact, mirroring, and imitation. The recordings are subsequently edited by the VIG professional, who selects micro-moments of the infant's contact initiatives and parents' positive responses to these signals. Finally, parents are invited to review these moments and to discuss them with the VIG professional. During the review, parents are asked to reflect actively on the nature and details of their interactions. Freeze frames (still images) are used to accentuate the successful moments of mutual parent-infant interaction and to provoke a discussion with the parents. This procedure of filming, editing, and shared review with the parents is repeated, as VIG usually consists of three recording and reviewing sessions, on average. The positive feedback loop generated by watching the video recordings is expected to improve effective communication between parent and infant, and sets goals for the next recording day.

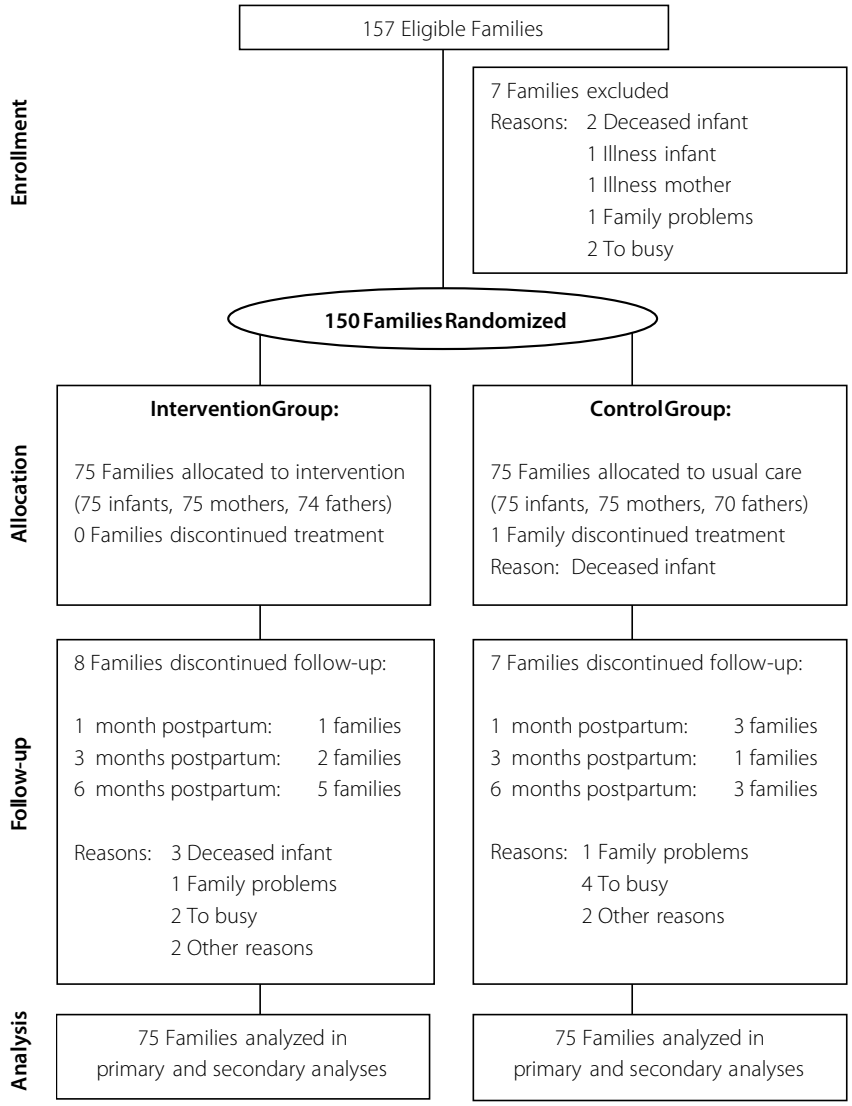
In the present study, VIG consisted of three sessions during the first week after birth. Consequently, not only parents of very preterms, but also of moderately preterms were able to complete the full intervention program while their infants were hospitalized. The intervention was delivered by circa 25 certified hospital-employed VIG professionals. Parents in the intervention group were videotaped at the 1st, 3rd, and 6th day postpartum, and received feedback the day after the recordings were made. Both parents were present during the video-recordings and review sessions. The VIG (filming, editing, and reviewing) was applied according to protocol and similar for all parents (Eliëns & Prinsen, 2008), whereas the feedback during the shared review sessions was adjusted to the specific needs of family (i.e., tailored to the parents' questions, their wishes, and their mental states at and during every session). Treatment fidelity checks were performed by the national coordinator and supervisor of VIG, who provided regular supervision to the interaction guides to ensure adherence to the intervention protocol.

Participants

A total of 157 eligible families with preterm infants agreed to participate in the study, of which 150 families (n = 150 infants, with n = 150 mothers and n = 144 fathers) were randomized to either the intervention (n = 75) or control group (n = 75). Slightly more mothers than fathers participated in the study, as six mothers were living without a partner. Unfortunately, it was not feasible to determine the exact number of families eligible for trial participation. Figure 6.1 shows the participant flow diagram of the study with the number of families through each stage of the trial. All families enrolled in the study received the intended treatment. All participants (mothers and fathers) allocated to the intervention group attended at least

one VIG session, 100% of the mothers and 93% of the fathers attended at least 2 sessions, and 95% of the mothers and 83% of the fathers attended all three VIG sessions. Six months postpartum, the proportion of families lost to follow-up was 10%. Throughout the study, drop-out rates were comparable for the intervention group (10.7%) and control group (9.3%). The randomized participants were all retained in the analyses of the data according to the intention-to-treat principle.

Figure 6.1 Participant flow



Outcome Measures

Parental interactive behavior

The effects on the main outcome, parental interactive behavior, were evaluated by means of 15-min video recordings capturing behavioral observations of daily dyadic parent-infant interaction. Videos were recorded at 1 day postpartum (i.e., T0, post-randomization and pre-intervention baseline measurement), 6 days postpartum (i.e., T1, mid-intervention measurement, after two VIG reviews), 1 month postpartum (i.e., T2, 3 weeks post-intervention) and 6 months postpartum (i.e., T3, 6 months post-intervention). Parent-infant triads were videotaped at the hospital or at the participants' home. Both mother-infant and father-infant interactions were captured on video. At T0, T1 and T2 recordings were made during daily moments of caregiving (e.g., bathing, changing, and feeding), whereas at T3, parents were provided with a standard set of toys and were asked to play with their child freely for 15 min. Manualized decision rules were used to quantify the verbal and nonverbal interactional behaviors of mothers and fathers.

The videotaped observations were rated by means of the coding scheme developed by the U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Child Health and Human Development Early Care Research Network (NICHD, 1999; Ravn et al., 2011). Minor adaptations were made to the original instrument to make it applicable to our population of parents with preterm infants, as well as for scoring parent-infant interaction at a very early stage (e.g., for scoring parental interaction with a medically fragile infant staying in an incubator). The ratings were assigned at six 4-point global rating scales (range = 1-4) which were subsequently clustered into three composite scores. The subscales Sensitivity to Non-distress and Positive Regard for the Infant were combined into the composite score for *Parental Sensitivity*. The subscales Intrusiveness and Negative Regard for the Infant were combined to assess *Parental Intrusiveness*. The subscales Detachment and Flatness of Affect were combined to evaluate *Parental Withdrawal*. All composite scores for parental interactive behavior ranged from very uncharacteristic to very characteristic interactive behavior on a 7-point scale (range = 1-7).

The videotapes were assessed by independent coders who were blind to each participant's group affiliation. Prior to scoring the video observations, all coders received standardized training for reliability, along with regularly scheduled supervision during the process of coding. Approximately 15% of the videos were randomly selected and double coded. Intraclass correlation coefficients (ICC) for interrater agreement were .67 and .69 for maternal and paternal sensitivity, .78 and .73 for maternal and paternal intrusiveness, and .67 and .64 for maternal and paternal withdrawal respectively.

Parental bonding, stress, and psychological well-being

The secondary outcomes, i.e., parental bonding, stress responses, and psychological wellbeing were all examined by means of self-report measures. Parents individually completed a set of questionnaires at four measurement occasions: at 1 week (W1), 1 month (M1), 3 months (M3) and 6 months (M6) postpartum.

The 25-item *Postpartum Bonding Questionnaire* (PBQ; Brockington, 2001), completed at M1 and M6, was designed to diagnose early disorders in the parent-infant relationship and comprises the subscales Impaired Bonding, Rejection and Anger, Infant Focused Anxiety, and Incipient Abuse. In the present study, we used the sum score (range = 0-125). High scores are indicative of serious parental problems in bonding with the infant. The PBQ is a reliable (mothers: α = .74 and .67, fathers: α = .80 and .80) and valid measure, with the exception of the subscale on Risk of Abuse (e.g., Wittkowski, Wieck, & Mann, 2007).

The *My Baby and I* questionnaire (MBI; Furman & O'Riordan, 2006), completed at W1 and M3, assesses the parent-infant relationship, comprising the areas Worry (MBI-W; 3-items, range = 3-15), Enjoyment and Responsiveness (MBI-ER; 7-items, range = 7-31) and Separation Anxiety (MBI-SA; 4-items, range = 4-20). Higher scores indicate greater infant-related concern, more positive feelings about and responsiveness to the infant, or greater parental anxiety on leaving the infant. Internal consistency in the current sample ranged from acceptable to very good across the dimensions MBI-W (mothers: α = .90 and .77, fathers: α = .88 and .75), MBI-ER (mothers: α = .83 and .60, fathers: α = .83 and .67), and MBI-SA (mothers: α = .70 and .82, fathers: α = .70 and .75).

The questionnaire version of the *Yale Inventory of Parental Thoughts and Actions* (YIPTA; Feldman, Weller, Leckman, Kuint, & Eidelman, 1999), completed at M1, assesses aspects of parental bonding and distress in the post-partum period. The subscales Frequency of Thoughts and Worries (YIPTA-FTW; 9 items, range = 0-36), Distress caused by Thoughts and Worries (YIPTA-DTW; 5-items, range = 0-20), Compulsive Checking (YIPTA-CC; 4-items, range = 0-16), Affiliative Behavior (YIPTA-AB; 5-items, range = 0-20) and Attachment Representations (YIPTA-AR; 4-items, range = 0-16) were included. Higher scores indicate intensified infant-related worries and distress since childbirth, or enhanced bonding and caretaking behaviors. The YIPTA has been validated in studies with parents of term and preterm infants (Feldman, Gordon, & Zagoory-Sharon, 2011). In the present sample, the scale demonstrated good to excellent internal consistency for YIPTA-FTW (mothers: α = .92, fathers: α = .90), YIPTA-DTW (mothers: α = .87, fathers: α = .86), and YIPTA-CC (mothers: α = .81, fathers: α = .77), and a mediocre level of consistency for YIPTA-AB (mothers: α = .55, fathers: α = .66) and YIPTA-AR (mothers: α = .55, fathers: α = .59).

The 34-item *Parental Stress Scale: Neonatal Intensive Care Unit* (PSS:NICU; Miles, Funk, & Carlson, 1993), completed at W1, gauges parental stress responses related to the hospital environment. To apply the instrument in a population of both moderately and very preterm infants, parents were asked to rate the items on five point Likert scales, ranging from

'not experienced' (1) or 'not stressful' (1) to 'extremely stressful' (5). The instrument was subsequently scored on Metric 2, 'the overall stress level'. The sum score of the measure was used (range = 34-170), with higher scores reflecting a higher stress level. In previous studies the PSS:NICU demonstrated appropriate psychometrics, in terms of reliability, construct and concurrent validity (Franck, Cox, Allen, & Winter, 2005). The data of the current sample established very good internal consistency of the measure (mothers: α = .94, fathers: α = .94).

The 10-item *Edinburgh Postnatal Depression Scale* (EPDS; Cox, Holden, & Sagovsky, 1987), the 20-item *State-Trait Anxiety Inventory* (STAI-State; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) and the 15-item *State-Trait Anger Expression Inventory* (STAXI2-State; Spielberger, 1999), completed at M1, assess feelings of postnatal depression, state anxiety, and state anger in parents. Higher scores indicate more depressive symptoms (range = 0-30), higher levels of anxiety (range = 20-80), and anger (range = 15-60) as an emotional state. These widely used questionnaires have been verified as reliable and valid screening instruments to detect symptoms of depression, anxiety, and anger in various populations (Eberhard-Gran, Eskild, Tambs, Opjordsmoen, & Samuelsen, 2001; Spielberger, & Reheiser, 2004). The internal consistency estimates in the present sample were good to excellent for the EPDS (mothers: α = .87, fathers: α = .76), the STAI-State (mothers: α = .94, fathers: α = .93), and the STAXI2-State (mothers: α = .92, fathers: α = .87).

Maternal trauma

In addition to the main analyses, mothers' experience of psychological trauma in childbirth was examined for subgroup analysis using the four stressor items of the *Traumatic Event Scale* (TES; Criterion A) (Wijma, Soderquist, & Wijma, 1997; Soet, Brack, & Dilorio, 2003). The TES stressor items were scored on 4-point rating scales ranging from 'not at all' (1) to 'very much' (4). Mothers completed the four questions within 24 hr after delivery (i.e., T0, after randomization and pre-intervention baseline measure). To differentiate between mothers who perceived the preterm birth as traumatic, and mothers who did not perceive it as traumatic, mothers' responses were examined according the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.), 1994, Washington, DC event criteria. For the experience of preterm childbirth to be classified as traumatic, both the "threat" and the "emotional response" criteria had to be met, i.e., a response of 'much' (3) or 'very much' (4). The threat criterion was met if the preterm childbirth was qualified by the mother as a trying experience (Item 1) or as a threat to the physical integrity of herself or her baby (Item 3). The emotional response criterion was met if the mother felt physically offended or violated during delivery (Item 2) or if she experienced feelings of intense fear, helplessness, or horror (Item 4). Since questionnaires assessing the psychological impact of childbirth typically only include event criteria specific to mothers' experiences, we did not examine fathers' postpartum traumatic responses in the current study.

Sample size

The study's target sample size was based on the primary outcome variable, parental sensitivity, using the scale scores of Sensitivity to Non-distress and Positive Regard for the Infant (NICHD, 1999; Ravn et al., 2011). Based on previous studies on the quality of parent-infant interaction, we considered a difference of .50 SD and .75 SD between the intervention and control group as clinically meaningful (NICHD SECCYD, n.d.). Assuming a mean score and standard deviation of M = 3.23, SD = .77, for Sensitivity to Non-distress, a sample size of 29 (considering a .75 SD) to 63 (considering a .50 SD) participants in each group would provide 80% power to identify a clinical significant difference on parental interactive behavior at a two-sided 5% significance level. A mean score and standard deviation of M = 3.69, SD = .57, for the subscale Positive Regard for the Infant would result in a needed sample size of 28 (considering a .75 SD) to 63 (considering a .50 SD). This number has been increased to 75 per study group, taking into account the anticipated drop out (15%).

Statistical analyses

To evaluate the added value of VIG treatment as an adjunct to standard hospital care, the mean differences in outcomes on parental interactive behavior, bonding, stress, and psychological well-being were examined between the intervention and control group. In addition, subgroup analyses on interactive behavior and bonding problems were performed in mothers who had experienced the preterm childbirth as a traumatic event. All endpoints of the study were analyzed on an intention-to-treat basis to maintain the integrity of randomization. In all analyses, the infant's gestational age at birth, parental educational level, and parity were included as time-invariant covariates. Outcomes were analyzed separately for mothers and fathers. In case of twins (n = 28), only outcomes regarding the firstborn infant were included in the analyses. Because random treatment allocation can still lead to chance fluctuations, the demographic and clinical characteristics of the intervention and control group (see Table 6.1) were compared at baseline using *t* tests for continuous variables and X^2 analyses for categorical variables. Study groups did not differ on demographic as well as clinical background characteristics at trial entry.

Parental interactive behavior

The effect of VIG on the repeatedly measured parental interactive behavior was examined by means of multilevel modeling (MLM) using the linear mixed-effects procedure in SPSS with maximum likelihood (ML) estimation (Curran, Obeidat, & Losardo, 2010; Heck, Thomas, & Tabata, 2010). The analyses were performed on the composite scores for parental sensitivity, intrusiveness and withdrawal, as observed in the videotapes of parent-infant interaction. In MLM statistical analysis of longitudinal data, the measurement occasions are nested within individuals. By modeling the variances and covariances, MLM allows for the estimation of

inter-individual differences in intra-individual patterns of change over time. Moreover, the MLM approach can accommodate missing data points under the assumption that data are missing at random (MAR). To compare the fit of successive models, likelihood ratio tests were used in combination with changes in Akaike's Information Criterion (AIC; smaller criterion values indicate better model fit to the data). To evaluate the intervention effects for mothers who experienced the preterm childbirth as traumatic, additional subgroup analyses were performed.

Table 6.1 Demographic and clinical characteristics of sample by treatment condition

	Intervention Group n = 75 families	**Control Group** n = 75 families
Infant medical data, *n*	75	75
Male sex, *%*	57.3	54.7
Twins, *%*	13.3	24.0
GA at birth, *weeks*	32 (3.1)	32 (3.1)
GA at birth, *range*	25 - 37	25 - 37
Birth weight, *grams*	1828 (735)	1770 (663)
Birth weight, *range*	556 - 4280	592 - 3770
5-min APGAR	8.7 (1.4)	8.3 (1.7)
Incubator, *days*	22.5 (20.7)	23.4 (24.8)
Mortality, *%*	4.0	1.3
Maternal demographic data, *n*	75	75
Maternal age at birth, *years*	31.1 (4.9)	30.8 (5.4)
Birth order	1.4 (0.6)	1.2 (0.5)
Nationality Dutch , *%*	92.0	93.3
Educational level [a]	2.2 (0.7)	2.2 (0.8)
Paternal demographic data, *n*	74	70
Paternal age at birth, *years*	34.1 (5.4)	33.6 (5.5)
Birth order	1.5 (0.7)	1.3 (0.7)
Nationality Dutch , *%*	89.2	92.9
Educational level [a]	2.1 (0.9)	2.3 (0.8)
Single/divorced parents [b], *n*	2	5

Note. Values are expressed as mean (SD) unless otherwise indicated.
[a] Educational level was classified as low, 1; medium, 2; high, 3.
[b] Single/divorced parents: i.e., 1 divorced couple (both mother and father participated in the study), and 6 single mothers (only the mothers participated in the study).

Parental bonding, stress, and psychological wellbeing

Analyses of covariance (ANCOVA) were used to compare the intervention and control group for outcomes on parental bonding, stress responses and psychological wellbeing. The method of multiple imputation (MI; generating 40 multiple imputed datasets) was applied to account for missing data in the analyses. To evaluate the intervention effects for mothers who experienced the preterm childbirth as traumatic, additional subgroup analyses were performed on the PBQ sub score as the main bonding outcome.

RESULTS

Parental interactive behavior

For the composite scores of parental sensitivity, intrusiveness and withdrawal, sequences of increasingly more extensive MLM models were evaluated: the intercept-only or unconditional means model (empty, Model A), the unconditional growth model (empty time, Model B), a conditional growth model (+Covariates, Model C) and an intervention moderated conditional growth model (+Time × Intervention, Model D) (Singer & Willet, 2003). Table 6.2 provides a summary of the model fit of these multilevel models for parental interactive behavior. We discuss the results in more detail in the next paragraphs.

In a first analytic step, unconditional means models (Model A) were used to evaluate the amount of variability in parental interactive behavior within- and between individuals. The resulting intraclass correlation coefficients (ICCs) indicated that a significant amount, 47% to 57%, of the total variability in parental interactive behavior could be attributed to individual differences. In a second step, unconditional growth models (Model B) were used to assess the individual variability in outcome-trajectories across time. Time was coded categorically, with the pre-intervention baseline measurement (T0) as reference category. Comparisons between Models A and B showed that adding time to the null models of parental interactive behavior improved model fit in both mothers and fathers, indicating the relevance of individual differences in outcome-trajectories. In a third step, the control variables, the infant's gestational age at birth, parental educational level, and parity were added as covariates. The resulting conditional growth curve models (Model C) provided a better fit to the data for all composite scores of maternal and paternal interactive behavior. In the fourth step, the models were expanded to test the intervention effect on parental sensitivity, intrusiveness, and withdrawal over time (Model D). This final model D was used to investigate the impact of the VIG intervention. The estimates of fixed effects for the intervention models of maternal and paternal sensitivity, intrusiveness, and withdrawal are provided in Table 6.3. In Figure 6.2, the adjusted means of maternal and paternal interactive behavior are displayed over time for the intervention group and control group.

Table 6.2 Comparisons of multilevel models for maternal and paternal sensitivity, intrusiveness, and withdrawal

			Sensitivity				Intrusiveness				Withdrawal			
	Model		**AIC**	**–2LL**	**df**	**X^2**	**AIC**	**–2LL**	**df**	**X^2**	**AIC**	**–2LL**	**df**	**X^2**
Mothers	**A**	**Empty Model**	1602.43	1596.43	-	-	1493.79	1487.79	-	-	1595.38	1589.38	-	-
	B	**Empty Time Model**	1550.34	1522.34	11	74.09 *	1444.34	1416.34	11	71.46 *	1504.30	1476.30	11	113.08 *
	C	**+ Covariates**	1500.25	1466.25	3	56.09 *	1390.02	1356.02	3	60.32 *	1455.99	1421.99	3	54.30 *
	D	**+ Time x Intervention**	1495.70	1452.70	4	13.55 *	1395.45	1353.45	4	2.56	1451.70	1409.70	4	12.29 *
	E	**+ Trauma x Intervention**	1418.99	1372.99	2	79.71 *	1332.09	1286.09	2	67.37 *	1383.43	1337.43	2	72.27 *
Fathers	**A**	**Empty Model**	1357.26	1351.26	-	-	1299.85	1293.85	-	-	1458.72	1452.72	-	-
	B	**Empty Time Model**	1342.32	1314.32	11	36.94 *	1226.19	1198.19	11	95.66 *	1431.82	1403.82	11	48.90 *
	C	**+ Covariates**	1256.84	1222.84	3	91.48 *	1155.49	1121.49	3	76.71 *	1329.52	1295.52	3	108.30 *
	D	**+ Time x Intervention**	1252.21	1210.21	4	12.63 *	1159.81	1117.81	4	3.68	1324.59	1282.59	4	12.93 *

Note. * X^2 Difference Test $p<0.05$

Below, we will outline the main differences in these trajectories across time for each of the three outcome variables. Parental intrusiveness was observed less frequently and values were positively skewed (mothers: skewness = 1.76, kurtosis = 3.37; fathers: skewness = 1.88, kurtosis = 3.75), in contrast to parental sensitivity (mothers: skewness = –0.33, kurtosis = 0.24; fathers: skewness = –0.33, kurtosis = 0.14) and withdrawal (mothers: skewness = 1.13, kurtosis = 0.68; fathers: skewness = 0.80, kurtosis = –0.09). However, because similar conclusions were reached when we took the natural log of the data, and the statistics proved to be robust to non-normality, we choose to report the untransformed values instead of the logarithmically transformed values to facilitate interpretation for clinical applicability of the results.

Parental sensitivity

The intervention Model D was significantly better than Model C in which only the covariates were included. Parents in the intervention group showed more sensitive interactive behavior at mid- and post-intervention measurements (i.e., T1 × intervention (after two VIG reviews) and T2 × Intervention, respectively), as compared to parents in the control group (mothers' T1 × Intervention: $\beta = 0.42 \pm 0.14$, $p = 0.004$, $d = 0.24$; fathers' T1 × Intervention: $\beta = 0.40 \pm 0.19$, $p = 0.04$, $d = 0.58$; mothers' T2 × Intervention: $\beta = 0.59 \pm 0.18$, $p = 0.001$, $d = 0.35$; fathers' T2 × Intervention: $\beta = 0.41 \pm 0.20$, $p = 0.04$, $d = 0.54$). However, at 6 months follow-up, no differences between treatment groups were observed in either mothers' or fathers' sensitive behavior (i.e., T3 x Intervention).

Parental intrusiveness

The intervention Model D did not improve the covariate Model C in both parents, indicating that parental intrusive behavior was not affected by the VIG intervention.

Parental withdrawal

The intervention Model D was significantly better than Model C, in which only the covariates were included. Mothers in the intervention group showed less withdrawn interactive behavior at mid-intervention and 3 weeks post-intervention measurements, as compared with mothers in the control group (T1 x Intervention: $\beta = -0.41 \pm 0.16$, $p = .01$, $d = -0.31$; T2 x Intervention: $\beta = -0.59 \pm 0.20$, $p = .004$, $d = -0.44$). In fathers, the intervention effect on withdrawn behavior was marginally significant at mid-intervention measurement (T1 x Intervention: $\beta = -0.38 \pm 0.20$, $p = 0.055$, $d = -0.60$), and non-significant 3 weeks post-intervention (i.e., T2 x Intervention). At 6-months follow-up measurement, no differences between the treatment groups could be observed in mothers' or fathers' withdrawn behavior (i.e., T3 x Intervention).

In sum, VIG significantly changed parents' level of sensitivity (i.e., more sensitive and positive behavior) and detachment (i.e., less withdrawn and detached behavior) during parent-infant interaction. The effect sizes were small to moderate for mothers, and moderate to large for fathers. The intervention positively altered parental interactional behavior after 2 review sessions, but the effect faded over time. VIG was not found to change explicit intrusiveness in parents (i.e., intrusive and negative behavior).

Table 6.3 Estimates of fixed effects in the final multilevel model for maternal and paternal sensitivity, intrusiveness, and withdrawal

		Sensitivity [a]		Intrusiveness [a]		Withdrawal [a]	
	Parameter	**Estimate** (SE)	***p*- value**	**Estimate** (SE)	***p*-value**	**Estimate** (SE)	***p*-value**
Mothers	**Intercept**	4.49 (0.80)	<0.001	0.47 (0.70)	0.04	2.94 (0.81)	<0.001
	T1 [b]	0.30 (0.11)	0.01	0.00 (0.10)	0.97	–0.26 (0.12)	0.03
	T2 [b]	–0.16 (0.13)	0.21	0.33 (0.13)	0.01	0.03 (0.14)	0.84
	T3 [b]	0.26 (0.16)	0.10	0.34 (0.16)	0.03	–0.66 (0.15)	<0.001
	Gestational Age [c]	0.02 (0.02)	0.45	0.03 (0.02)	0.14	–0.02 (0.02)	0.50
	Parity [c]	0.12 (0.14)	0.37	–0.20 (0.12)	0.09	–0.03 (0.14)	0.82
	Educational Level [c]	0.43 (0.10)	<0.001	–0.37 (0.09)	<0.001	–0.41 (0.10)	<0.001
	Intervention [d]	–0.18 (0.18)	0.31	0.11 (0.16)	0.49	0.09 (0.21)	0.67
	T1 x Intervention	0.42 (0.14)	0.004	–0.01 (0.14)	0.96	–0.41 (0.16)	0.01
	T2 x Intervention	0.59 (0.18)	0.001	–0.16 (0.18)	0.38	–0.59 (0.20)	0.004
	T3 x Intervention	0.29 (0.22)	0.19	0.11 (0.22)	0.63	–0.26 (0.21)	0.22
Fathers	**Intercept**	3.33 (0.89)	<0.001	0.64 (0.69)	0.02	3.19 (0.92)	<0.001
	T1 [b]	0.18 (0.15)	0.21	0.12 (0.12)	0.32	–0.38 (0.15)	0.02
	T2 [b]	–0.15 (0.15)	0.31	0.67 (0.16)	<0.001	–0.13 (0.16)	0.43
	T3 [b]	–0.18 (0.17)	0.29	0.40 (0.15)	0.01	–0.35 (0.20)	0.08
	Gestational Age [c]	0.04 (0.02)	0.18	0.02 (0.02)	0.29	0.00 (0.03)	0.90
	Parity [c]	–0.28 (0.14)	0.05	–0.13 (0.11)	0.23	0.34 (0.15)	0.02
	Educational Level [c]	0.42 (0.10)	<0.001	–0.09 (0.08)	0.25	–0.53 (0.10)	<0.001
	Intervention [d]	0.21 (0.20)	0.30	0.10 (0.14)	0.48	–0.27 (0.24)	0.28
	T1 x Intervention	0.40 (0.19)	0.04	–0.05 (0.16)	0.78	–0.38 (0.20)	0.055
	T2 x Intervention	0.41 (0.20)	0.04	–0.32 (0.22)	0.13	–0.25 (0.21)	0.25
	T3 x Intervention	0.12 (0.23)	0.60	–0.14 (0.20)	0.49	–0.10 (0.27)	0.70

Note. Outcome measurements at baseline (pre-intervention, T0), mid-intervention (after two VIG reviews, T1), 3 weeks (T2) and 6 months (T3) post-intervention.

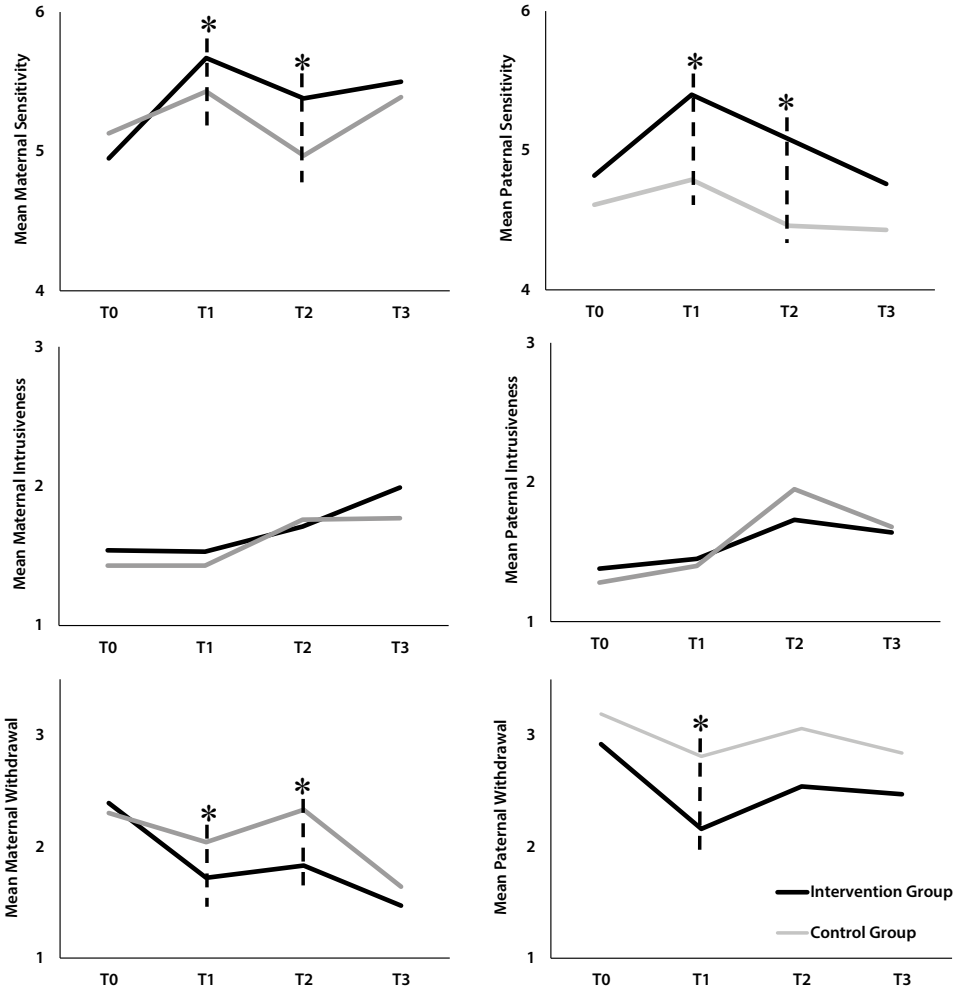
[a] Higher scores represent more of the indicated quality of parental behavior toward the infant (i.e., more sensitive, intrusive or withdrawn behavior).

[b] Time (T) was dummy-coded, with the pre-intervention baseline measurement (T0) as reference category.

[c] Higher scores indicate a higher gestational age at birth, higher parity births and higher educational level.

[d] The control group was coded as 0, the intervention group was coded as 1.

Figure 6.2 Adjusted means of maternal and paternal sensitivity, intrusiveness, and withdrawal over time by treatment condition [a]



Note. Outcome measurements at baseline (pre-intervention, T0), mid-intervention (after two VIG reviews, T1), 3 weeks (T2) and 6 months (T3) post-intervention. Outcomes are adjusted for gestational age at birth, parity, educational level, and the main intervention effect.

[a] Higher scores represent more of the indicated quality of parental behavior toward the infant (i.e., more sensitive, intrusive or withdrawn behavior).

* $p<0.05$

Mothers: Cohen's *d* sensitivity T1 = 0.24, T2 = 0.35; Cohen's *d* withdrawal T1 = –0.31, T2 = –0.44.

Fathers: Cohen's *d* sensitivity T1 = 0.58, T2 = 0.54; Cohen's *d* withdrawal T1 = –0.60.

Parental bonding

The effects of VIG on maternal and paternal bonding (mean differences and corresponding *p*-values) are reported in Table 6.4. As there were minimal differences in unadjusted and adjusted estimates, only the covariate-adjusted means are presented. With regard to parental bonding significant differences between the intervention and control group were observed at post-intervention measurements.

One day post-intervention, both mothers and fathers in the intervention group reported significantly higher scores on enjoyment about and responsiveness to the infant (MBI-ER) as compared to the control group (mothers' mean difference at W1, 1.44; 95% CI, 0.42 to 2.46; $p = 0.01$; fathers' mean difference at W1, 2.10; 95% CI, 0.74 to 3.45; $p = 0.002$). No long term differences between the treatment conditions were observed in mothers' MBI-ER scores (i.e., mean difference at M3), whereas in fathers the effect of VIG on these outcomes was still present at M3 (mean difference at M3, 0.73; 95% CI, 0.02 to 1.43; $p = 0.04$). At M1, both mothers and fathers in the intervention group reported more affiliative behavior towards the infant (YIPTA-AB; mothers' mean difference at M1, 1.19; 95% CI, 0.18 to 2.20; $p = 0.02$; fathers' mean difference at M1, 1.89; 95% CI, 0.38 to 3.41; $p = 0.01$). In addition, fathers in the intervention group reported a higher level of checking on the infant (YIPTA-CC; mean difference at M1, 1.66; 95% CI, 0.36 to 2.97; $p = 0.01$), whereas no difference between treatment groups was observed in mothers' outcomes (i.e., mean difference at M1). With respect to attachment representations (YIPTA-AR), the differences between the groups did not reach significance in mothers (i.e., mean difference at M1) or in fathers (i.e., mean difference at M1). There were no effects of VIG on maternal reported bonding problems (PBQ-Sum; i.e., mean difference at M1 and M6), yet the outcomes on paternal bonding problems were significantly different between the intervention and control group. Fathers who received VIG reported fewer difficulties in parent-infant bonding at M1 (mean difference at M1, −2.10; 95% CI, −4.05 to −0.13; $p = 0.04$) as well as M6 post-intervention (mean difference at M6, −2.08; 95% CI, −3.88 to −0.28; $p = 0.02$).

In sum, VIG had a significantly positive effect on several aspects of parent-infant bonding, in particular for fathers. While dissipation of the behavioral intervention effects occurred across time, the effects on paternal bonding were maintained until M6 follow-up.

Parental stress and psychological wellbeing

The effects of VIG on maternal and paternal stress responses and psychological wellbeing are reported in Table 6.5. The comparative analyses revealed no statistically significant intervention effects. At W1 and at M1 post-intervention, there were no differences between the treatment groups on maternal and paternal NICU-related stress responses (PSSNICU-Sum), infant related worries and distress (MBI-W, YIPTA-FTW, YIPTA-DTW), or infant

separation anxiety (MBI-SA). Regarding parental feelings of postnatal depression (EPDS), state anxiety (STAI-State), or state anger (STAXI2-State) no differences between treatment groups were detected.

In sum, VIG did not influence parents' level of stress and concerns related to infant's health status and the hospital/NICU environment. Neither did the intervention affect parents' psychological well-being or emotional state.

Table 6.4 Adjusted intervention effects on maternal and paternal bonding

			Intervention Group	Control Group	Mean Difference		
Outcomes		**T**	**Mean** (SE)	**Mean** (SE)	**Mean**	**(95% CI)**	***p*-value**
Mothers	**MBI-ER**	W1	29.40 (0.36)	27.96 (0.37)	1.44	(0.42 to 2.46)	0.01
	MBI-ER	M3	30.13 (0.21)	29.75 (0.22)	0.38	(–0.22 to 0.98)	0.21
	YIPTA-CC	M1	7.88 (0.49)	7.59 (0.50)	0.29	(–1.12 to 1.71)	0.68
	YIPTA-AB	M1	14.29 (0.37)	13.10 (0.36)	1.19	(0.18 to 2.20)	0.02
	YIPTA-AR	M1	11.23 (0.44)	10.67 (0.41)	0.56	(–0.61 to 1.75)	0.35
	PBQ-Sum	M1	5.60 (0.54)	6.31 (0.54)	–0.71	(–2.23 to 0.80)	0.36
	PBQ-Sum	M6	4.53 (0.44)	4.04 (0.44)	0.49	(–0.74 to 1.71)	0.44
Fathers	**MBI-ER**	W1	28.05 (0.47)	25.95 (0.49)	2.10	(0.74 to 3.45)	0.002
	MBI-ER	M3	29.69 (0.25)	28.96 (0.25)	0.73	(0.02 to 1.43)	0.04
	YIPTA-CC	M1	7.20 (0.44)	5.54 (0.48)	1.66	(0.36 to 2.97)	0.01
	YIPTA-AB	M1	12.76 (0.51)	10.87 (0.56)	1.89	(0.38 to 3.41)	0.01
	YIPTA-AR	M1	9.38 (0.47)	8.20 (0.49)	1.18	(–0.18 to 2.54)	0.09
	PBQ-Sum	M1	7.72 (0.69)	9.82 (0.71)	–2.10	(–4.05 to –0.13)	0.04
	PBQ-Sum	M6	5.85 (0.63)	7.93 (0.66)	–2.08	(–3.88 to –0.28)	0.02

Note. Outcomes are adjusted for gestational age at birth, parity and parental educational level.
Outcome measurements at 1 day (W1), 3 weeks (M1), 3 months (M3), and 6 months (M6) post-intervention. Abbreviations questionnaires: My Baby and I Questionnaire (MBI): Enjoyment / Responsiveness = MBI-ER; Yale Inventory of Parental Thoughts and Actions (YIPTA): Compulsive checking = YIPTA-CC, Affiliative behavior = YIPTA-AB, Attachment representations = YIPTA-AR; Postpartum Bonding Questionnaire (PBQ) = PBQ-Sum.

Maternal trauma

Baseline comparisons revealed that 20.7% ($n = 31$) of the participating mothers experienced the preterm childbirth as a traumatic event ("trauma subgroup"). Of these women, 48.4% (n = 15) were in the intervention group and 51.6% (n = 16) in the control group.

To assess the intervention effect on interactional behavior for the trauma subgroup, the main effect of maternal trauma as well as the interaction term Intervention × Trauma were added to the ML models of maternal sensitivity, intrusiveness and withdrawal (+Trauma × Intervention, Model E), see Table 6.2 and Figure 6.3. Comparison between the intervention model D and trauma model E showed that adding the Trauma × Intervention interaction

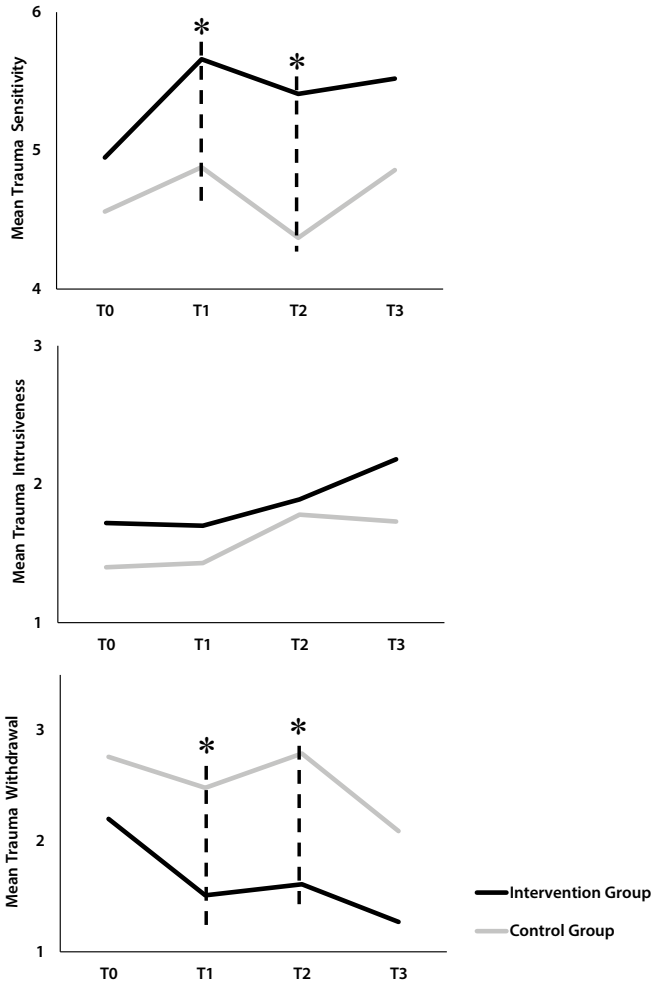
effect to the intervention model significantly improved model fit for maternal interactional behaviors. Parameter estimates revealed that mothers who had perceived the preterm birth as traumatic, showed significantly less sensitive behavior (β = −0.59 ± 0.24, p = .02) and more withdrawn interactional behavior (β = 0.65 ± 0.25, p = .01) than mothers who did not perceive the preterm birth as traumatic. The Trauma x Intervention interaction effect revealed that the mothers with trauma receiving VIG, demonstrated significantly more sensitive behavior (β = 0.81 ± 0.35, p = .02) and less withdrawn behavior (β = −0.87 ± 0.36, p = 0.02) as compared with trauma mothers in the control group. In the subset of trauma mothers, large effect sizes were found for the increases in sensitivity (d = 0.80 at T1, d = 0.91 at T2) and decreases in withdrawal (d = −0.80 at T1, d = −1.04 at T2). The intervention did not affect intrusive behavior in trauma mothers.

Table 6.5 Adjusted intervention effects maternal and paternal stress and psychological wellbeing

			Intervention Group	Control Group	Mean Difference		
Outcomes		**T**	**Mean** (SE)	**Mean** (SE)	**Mean**	**(95% CI)**	***p*-value**
Mothers	**PSSNICU-Sum**	W1	71.95 (2.59)	72.97 (2.59)	−1.02	(−8.23 to 6.21)	0.78
	MBI-W	W1	6.39 (0.34)	6.43 (0.34)	−0.04	(−0.97 to 0.90)	0.94
	MBI-W	M3	4.61(0.22)	4.27 (0.22)	0.34	(−0.25 to 0.95)	0.26
	MBI-SA	W1	13.57(0.34)	13.48 (0.33)	0.09	(−0.83 to 1.01)	0.84
	MBI-SA	M3	12.09 (0.41)	11.92 (0.39)	0.17	(−0.95 to 1.29)	0.77
	YIPTA-FTW	M1	17.38 (1.10)	17.04 (1.14)	0.34	(−2.73 to 3.43)	0.83
	YIPTA-DTW	M1	6.45 (0.62)	6.46 (0.62)	−0.01	(−1.72 to 1.70)	0.99
	STAXI2-State	M1	15.84 (0.45)	16.59 (0.44)	−0.75	(−1.99 to 0.48)	0.23
	STAI-State	M1	32.00 (1.22)	31.80 (1.26)	0.20	(−3.12 to 3.53)	0.90
	EPDS	M1	6.71 (0.60)	7.34 (0.62)	−0.63	(−2.30 to 1.04)	0.46
Fathers	**PSSNICU-Sum**	W1	61.99 (2.28)	63.82 (2.34)	−1.83	(−8.31 to 4.64)	0.58
	MBI-W	W1	6.38 (0.35)	6.30 (0.37)	0.08	(−0.93 to 1.08)	0.88
	MBI-W	M3	4.12 (0.22)	4.18 (0.23)	−0.06	(−0.68 to 0.56)	0.84
	MBI-SA	W1	11.88 (0.33)	11.22 (0.35)	0.66	(−0.31 to 1.62)	0.18
	MBI-SA	M3	9.88 (0.37)	9.57 (0.34)	0.31	(−0.66 to 1.29)	0.52
	YIPTA-FTW	M1	17.90 (1.05)	17.10 (1.07)	0.80	(−2.22 to 3.82)	0.60
	YIPTA-DTW	M1	5.91 (0.53)	5.05 (0.55)	0.86	(−0.65 to 2.37)	0.26
	STAXI2-State	M1	15.70 (0.45)	16.59 (0.44)	−0.89	(−1.87 to 0.09)	0.08
	STAI-State	M1	31.41 (1.16)	32.21 (1.24)	−0.80	(−4.01 to 2.40)	0.62
	EPDS	M1	4.01 (0.40)	3.54 (0.44)	0.47	(−0.72 to 1.66)	0.44

Note. Outcomes are adjusted for gestational age at birth, parity and parental educational level.
Outcome measurements at 1 day (W1), 3 weeks (M1) and 3 months (M3) post-intervention.
Abbreviations questionnaires: My Baby and I Questionnaire (MBI): Worry = MBI-W, Separation anxiety = MBI-SA; Yale Inventory of Parental Thoughts and Actions (YIPTA): Frequency of thoughts and worries = YIPTA-FTW, Distress caused by thoughts and worries = YIPTA-DTW; Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU) = PSSNICU-Sum; State-Trait Anger Expression Inventory-2 (STAXI): State anger = STAXI2-State; State-Trait Anxiety Inventory (STAI): State anxiety = STAI-State; Edinburgh Postnatal Depression Scale = EPDS.

Figure 6.3 Adjusted means of maternal sensitivity, intrusiveness and withdrawal over time by treatment condition, for mothers with a traumatic preterm childbirth [a]



Note. Outcome measurements at baseline (pre-intervention, T0), mid-intervention (after two VIG reviews, T1), 3 weeks (T2) and 6 months (T3) post-intervention. Outcomes are adjusted for gestational age at birth, parity, educational level, and the main intervention effect.

[a] Higher scores represent more of the indicated quality of parental behavior toward the infant (i.e., more sensitive, intrusive or withdrawn behavior).

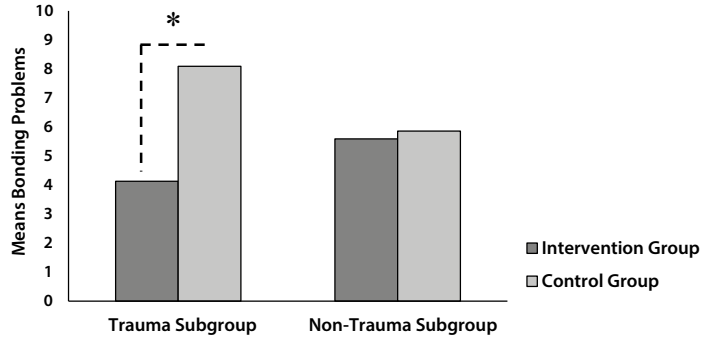
* $p<0.05$

Cohen's *d* sensitivity T1 = 0.80, T2 = 0.91; Cohen's *d* withdrawal T1 = –0.80, T2 = –1.04.

To assess the intervention effect on mother-infant bonding problems for the trauma subgroup, additional subgroup analyses were performed on the PBQ sum-score. Figure 6.4 shows the covariate-adjusted intervention effect on mothers' reported bonding problems, comparing the trauma subgroup with the non-trauma subgroup. Within the trauma subgroup, significant differences between the treatment groups were detected. Mothers in the trauma group who received VIG reported significantly less problems in bonding with the infant at M1 post-intervention (mean difference at M1, −4.22; 95% CI, −8.37 to −0.08; $p = 0.04$). In contrast, in the non-trauma group no such effects of VIG on maternal bonding (mean difference at M1, −0.06; 95% CI, −2.11 to 1.99; $p = 0.96$) could be detected.

In sum, maternal traumatic experience was found to be an important factor affecting mother-infant interaction and bonding. This subset of mothers who experienced the preterm birth as traumatic tended to benefit considerably from VIG, in terms of behavior and bonding.

Figure 6.4 Adjusted intervention effect on reported bonding problems, for mothers with a traumatic and for mothers with a non-traumatic preterm childbirth



Note. Outcome measurements at 3 weeks (M1) post-intervention.
Outcomes are adjusted for gestational age at birth, parity and maternal educational level.
* $p<0.05$

DISCUSSION

The aim of this study was to evaluate a Video Interaction Guidance (VIG) intervention in parents experiencing preterm birth. VIG proved to be effective in enhancing positive maternal and paternal interactive behavior during daily dyadic parent-preterm infant interaction. Furthermore, VIG positively affected feelings of parental bonding. The intervention effects were particularly prominent in fathers, and in mothers who experienced the preterm birth as very traumatic. On the other hand, VIG failed to ameliorate the level of intrusive behavior in parents, or their emotional stress responses after preterm birth.

With regard to the effects on parental interactive behavior; mothers and fathers in the intervention group demonstrated more sensitive behavior (i.e., an increase in sensitivity and positive regard) and less withdrawn behavior (i.e., a decrease in detachment and flatness of affect), compared with parents in the control condition. These results are in line with previous studies (see Bakermans-Kranenburg, van IJzendoorn, & Juffer (2003) and Fukkink (2008)), which showed that the use of video-feedback is effective in promoting sensitive behavior in parents. It is important to note, however, that the behavioral effects were relatively short term, that is, until one month postpartum assessments. Nevertheless, the findings might be clinically relevant because the early postnatal period is known to be an essential developmental phase, a period in which the infant is very susceptible to external influences such as parenting behaviors (e.g., Leckman et al., 2004; Feldman, & Eidelman, 2007; Ravn et al., 2011; Ramchandani et al., 2013). This applies also to prematurely born infants, both moderately and very preterm, who are exposed to their postnatal environment during a critical developmental period of rapid brain growth and neuronal maturation (Kinney, 2006). Since these infants undergo hospitalization and often invasive medical procedures at a time when they are extremely vulnerable to external conditions, the normal development of brain structures may easily be disrupted. The infant's (in)ability to manage the distress associated with the hospital environment and to regulate its behavior during medical procedures, becomes manifest during interaction with caregivers. The promotion of sensitive parental care and handling during the period of hospitalization is therefore of great importance for the preterm infant's well-being and development (Van den Berg, 2007).

However, while VIG appeared successful in improving parental sensitivity and involvement after preterm birth, the intervention failed to reduce explicit intrusive behaviors in parents (i.e., intrusiveness and negative regard). Our results on intrusiveness are difficult to compare with outcomes of previous video-feedback intervention studies, as earlier research primarily focused on the presence or absence of parental sensitivity, instead of actually coding negative behaviors. Insensitive behavior, however, is qualitatively different from purely negative or intrusive behavior. Parents, for example, may show insensitive behavior by a lack of warmth and responsivity in their interactions, but do not show intrusiveness either. We feel that assessment of these problematic caregiver behaviors is clinically useful, because parental sensitivity does not predict disorganized attachment in infants, while atypical, extremely insensitive, disturbed and maltreating caregiving behaviors are important precursors of infant attachment insecurity and disorganization (Benoit, Madigan, Lecce, Shea, & Goldberg, 2001; Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999).

A possible explanation for the failure to influence intrusive behavior could be that VIG aims to promote behavior change in parents primarily by emphasizing the positive aspects of the parent-infant interaction (Kennedy, Landor, & Todd, 2011; Eliëns, 2010). Parents are specifically guided to reflect on video fragments of their own successful interactions, not

on their negative responses to the infant's initiatives. It has been suggested that a focus on parental sensitivity would be more effective in decreasing parental disruptive behaviors, than a focus on the presenting problem itself (Benoit et al., 2001; Kennedy, 2011). Yet our findings suggest that an intervention with an exclusive focus on positive interactional behavior may not meet the specific needs of parents with serious parenting issues. Research among depressed mothers indicated that interventions may have differential effects on mothers with withdrawn versus intrusive interaction styles (Field, Hernandez-Reif, & Diego, 2006). When interaction patterns in parent-infant dyads are characterized by high levels of intrusiveness or negativity, VIG alone might not suffice to support parents. In multi-problem families, these interventions might be more effective when complemented with other types of support (Fukkink, 2008).

Our findings further show that VIG has a positive effect on several fundamental aspects in the process of bonding, such as enjoyment about and responsiveness to the infant. These feelings facilitate forming a strong bond in the first weeks after birth (Furman & O'Riordan, 2006). Obviously, the promotion of positive parental feelings and prevention of problems in parental bonding is deemed important after preterm childbirth, as a disrupted bonding process can negatively affect parents' interaction style and the parent-infant relationship. Especially in father-infant bonding positive effects were demonstrated, which maintained until 6-months follow-up. Fathers who received VIG reported more enjoyment, more affiliative behaviors, fewer problems in bonding, and also a higher degree of compulsive checking on their infant. During the first weeks after birth, compulsive checking by mothers is regarded as a behavioral component of 'primary maternal preoccupation' as described by Winnicott (1958). This preoccupation enables mothers to deeply focus on their infant and to completely attend to the infant's physical and emotional needs. Also in fathers, we consider such a state of heightened sensitivity to be important for the development of an affectionate relationship with the infant (Leckman et al., 2004).

There were no significant differences between the intervention and control group on self-reported intensity of emotions in parents, such as symptoms of depression, anxiety and anger. Moreover, the level of infant related distress and anxiety, as well as stress responses related to the hospital/NICU environment, were unaffected by the intervention. In other words, the negative feelings and concerns that typically accompany preterm birth do not seem to be reduced by the VIG intervention. Benzies, Magill-Evans, Hayden and Ballantyne (2013) distinguish the following three categories of key components of early intervention programs for parents of preterms: (a) provision of parental support (i.e., psychological counseling and social support), (b) parental education (i.e., information, demonstration and discussion, and active engagement with feedback from a professional) and, (c) therapeutic child developmental support. Interventions which include the components of parental psychological support in combination with psycho-education are found to be most

effective in diminishing psychological stress responses (i.e., distress, anxiety, and depressive symptoms) after preterm birth. Perhaps the fact that VIG does not provide psychological support, but merely psycho-education with a focus on successful moments of mutual parent-infant interaction may explain why the parents' stress levels were not decreased.

We also assessed intervention effects in mothers who qualified the preterm birth as traumatic, since maternal traumatic birth experiences may affect the quality of the mother-infant interaction (Muller-Nix, 2004). Our findings confirm that traumatic experiences are a major factor influencing the mother-infant relationship, in terms of interactional behavior as well as bonding. Moreover, the results support our hypothesis that VIG is particularly beneficial for those mothers who perceived the preterm birth as a traumatic event, with positive effects on maternal interactive behavior as well as on reported bonding problems. In the non-trauma group, no such effects of VIG on bonding problems were detected. Bakermans-Kranenburg, van IJzendoorn, and Juffer (2003) already showed that interventions aimed at improving maternal sensitivity seem to be particularly effective in clinical and high-risk samples. Perhaps mothers at high risk of developing problems in the mother-infant relationship benefit most from VIG, as the potential for improvement is greater for mothers who start with a lower than average level of interactional behavior and bonding.

Before discussing the potential implications of our findings for practice, the strengths and limitations of the study merit discussion. The main strengths of our study are the pragmatic randomized design of the trial and the intention-to-treat analyses of the results. Since the effectiveness of VIG was evaluated in everyday hospital practice, results can directly inform clinical decision making. Furthermore, both mothers and fathers were included. Moreover, the effectiveness of the intervention was evaluated on a broad range of behavioral and psycho-social outcomes.

On the other hand, the study has also some limitations that must be considered. First, it is not clear which part of the intervention program actually accounts for the effects. The change generating component could be parents' self-observations via video recordings, the provided information on the infant's initiatives and responsiveness, or the positive feedback by the VIG nurses. To gain understanding about the precise mechanisms that generate behavior change in parents, future research should focus on units smaller than the intervention effects. Second, we neither can provide information about the optimal number of VIG review sessions. Although the study's intervention consisted of three sessions in the first postpartum week, VIG already positively altered parental interactional behavior after two review sessions. However, the behavioral intervention effects dissipated over time. Further research is needed on the exact rate of decay of intervention effects, the effects on infant development and behavior, as well as the long-term outcomes in parents. Perhaps booster sessions (in hospital or at home) can increase the long term effects. In addition, some

methodological restrictions of the study must be noted. First, a disadvantage of the applied method of intention to treat is that it generally provides a more conservative estimate of the intervention effect compared with what would be expected with full compliance. In addition, increased levels of intervention adherence in a trial setting may challenge the generalizability of the results to clinical practice. Second, our results may suggest that the effects of VIG are stronger for fathers than for mothers, but a direct comparison between the outcomes of mothers and fathers was not conducted. Additional research on gender differences is necessary to further validate this notion. Third, the inter-rater agreement for the observational coding of parental behavior appears to be somewhat less than desirable. A final methodological limitation concerns the relatively small sample size of mothers who met the trauma criteria (n = 31). Further research into the generalizability of the findings on maternal trauma would be welcomed. This also holds for research on other subgroups of parents that might benefit of VIG; for instance fathers who experienced the preterm birth as traumatic, and mothers who experienced psychological problems (e.g., postnatal depression) or physical problems (e.g., HELLP syndrome) after preterm birth.

Clinical implications

The following implications for health care policy may be formulated. As VIG, a short-term, non-intrusive and relatively low-cost intervention, proved to be effective in enhancing the quality of parental interactive behavior and bonding in parents of preterm infants, implementation of the intervention in maternity wards and NICUs can be useful in supporting parents with a preterm infant. Because VIG showed significant effects in both mothers and fathers, it is advisable to include the mother-father-infant triad in the intervention when possible. Moreover, our findings may justify baseline screening on maternal trauma, as VIG was found to be particularly beneficial for the subset of mothers who experienced the preterm birth as traumatic. Since the intervention did not change intrusiveness in parents, identification of parent-infant dyads at risk for adverse interactive behavior is recommended. For these parents at risk of intrusive parenting, VIG might be more effective when integrated in a comprehensive support program that focuses on a wider range of problems.

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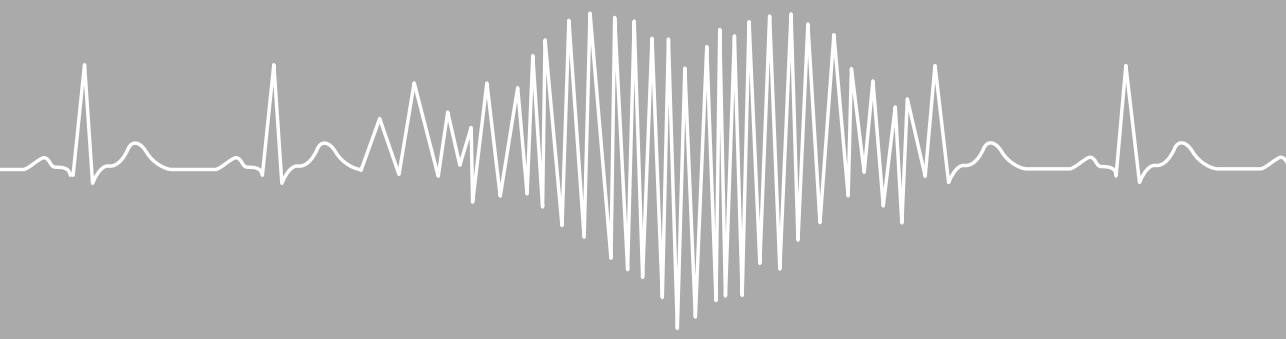
CHAPTER 7

Summary and general conclusion



INTRODUCTION

The premature birth of an infant is often a demanding and emotionally taxing event for parents, which can have a profound and long lasting effect on their psychological well-being (Holditch-Davis, Bartlett, Blickman, & Miles, 2003). Previous studies showed that the infants' unexpected early arrival, prolonged hospitalization, distinctive appearance and behavior, and uncertain developmental outcomes, are among the serious stressors that can place a considerable strain on parents (Goldberg & DiVitto, 2002). Uncertainty, however, remained as to whether these difficulties engendered by the premature birth impact upon later quality of parenting. Since studies have found higher incidences of parental abuse and neglect among children with a history of preterm birth (Spencer, Wallace, Sundrum, Bacchus, & Logan, 2006), it has been suggested that the infant's immaturity and the adverse conditions surrounding preterm birth may predispose to maladaptive parenting (Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Müller-Nix, 2011).

Therefore, the purpose of the present thesis was (1) to further examine the impact of preterm birth on the quality of parenting, and (2) to determine the predictive value of parent, infant, and contextual factors for poor parenting after term and preterm birth. Furthermore, this thesis aimed (3) to evaluate the effectiveness of Video Interaction Guidance, a preventive intervention to support the early parent-preterm infant relationship. Measures included interview, observational, and self-report data of mothers (N = 231) and fathers (N = 223) of term infants (≥37 weeks GA; N = 81), moderately preterm infants (≥32–37 weeks GA; N = 75), and very preterm infants (<32 weeks GA; N = 75). The primary outcome, parenting quality, was captured by parents' degree of bonding with the infant, their interactive behavior toward the infant, and their attachment representations of the infant.

SUMMARY OF THE MAIN FINDINGS

The **first study** (Chapter 2), approached the issue of parent-infant bonding from an evolutionary perspective and provided insight into the process of bonding development during the first postpartum month among parents of term and preterm infants. According to evolutionary theory parental bonding is not an innate process with a fixed outcome, but a process that is dependent on child characteristics and parents' access to resources. Based on this theory it was supposed that parents with adequate resources may invest preferentially in a high-risk infant so as to increase the probability of infant survival. The results of our study supported this contingent model of parental care. The longitudinal analyses revealed that maternal bonding increased after both moderately and very preterm birth, whereas paternal bonding increased only after very preterm delivery. These findings indicate that bonding is not a fixed given, but rather a process with its own dynamics. In

affluent countries with adequate resources, such as the Netherlands, postpartum bonding in parents of preterm infants on average may be higher than in parents of term infants.

The **second study** (Chapter 3) examined if the event of preterm birth provides a context for the development of less than optimal parental behavior, by evaluating the predictive value of parent, infant, and contextual factors. Parents' experiences and perceptions of birth stressors were therefore assessed after both term and preterm birth. The Clinical Interview for Parents of High-Risk infants (CLIP; Meyer, Zeanah, Zachariah Boukydis, & Lester, 1993) was used to systematically assess parents' experiences and perceptions related to the pregnancy, delivery, infant, hospitalization, support system, and their narratives at one month postpartum. Parental responses were subsequently factor analyzed and entered into prediction models of parental interactive behaviors at six months postpartum. Multiple group analyses confirmed that, compared with term delivery, preterm birth entailed more negative experiences and worries for parents. Moreover, preterm birth was initially associated with slightly less sensitive and more intrusive father-infant interactions. However, the regression analyses revealed that not the event of preterm birth itself, nor parental concerns about the infant's health and development or hospital environment, were predictive of suboptimal parenting practices. It were rather the presence of parental negative and unrealistic perceptions regarding the infant and the situation that were found related to parental behavior. More specifically, parents' unrealistic expectations regarding the infant's development, low levels of perceived social support, an initial negative reaction to the pregnancy, combined with features of disorganization in their narratives, were associated with less sensitive, more intrusive, and more withdrawn parental behaviors toward the infant at six months of age.

The **third study** (Chapter 4) focused on maternal psychological distress. Because maternal postpartum depression, anxiety, and post-traumatic stress symptoms are often construed as markers of vulnerability to poor parenting, we investigated whether heightened levels of distress after preterm birth place mother-infant dyads at risk for suboptimal behavior and non-optimal thoughts and feelings about the infant at six month postpartum. Results of the study indicated that mothers of preterm infants on average experienced more distress compared with mothers of term infants. Yet there appeared to be substantial heterogeneity in mothers' emotional responsivity. Latent class analysis identified five subgroups of mothers based on their levels of distress and parenting quality. The first Class (47%) of mothers was characterized by low levels of distress and high quality parenting, the second Class (20%) by low distress levels and low quality parenting, the third Class (22%) by high distress levels and medium quality parenting, and the fourth Class (9%) by high distress levels and high quality parenting. Finally the fifth and smallest Class (2%) was characterized by extremely high levels of distress and low quality parenting. These results challenge the notion that high, even in the clinical range, levels of maternal distress are always accompanied by low parenting

practices, and vice versa. High rates of distress after preterm birth do not necessarily seem to place mothers at increased risk for poor parenting. Conversely, low distress levels do not necessarily imply good quality parenting. A curvilinear relation was proposed between maternal distress and parenting. Moderate to high levels of distress were associated with optimal parenting, while both the extremes of very low (in case of very preterm birth) or extremely high distress levels were associated with disengaged and/or intrusive behavior and disengaged or distorted representations in mothers.

The **fourth study** (Chapter 5) examined predictors of disrupted parent-infant attachment at six months postpartum based upon variables assessed at one month postpartum. Because parental disrupted attachment representations have been found to be detrimental to parenting practices and infant mental health, we aimed to define prognostic groups of parent-infant dyads at risk. Recursive partitioning methods, using both random forests and decision trees, were applied to identify parental risk profiles associated with a greater probability of disrupted parent-infant attachment. The results revealed that none of the prematurity-related stressors, such as immaturity of the infant, parental concern about the infant's health and development, and parental psychological distress after birth, were associated with the development of parent-infant disrupted attachment. Conversely, parental negative and unrealistic perceptions of the infant and the context, as well as parental insensitive and intrusive interactive behaviors, were predictive of later disrupted attachment in parents of term and preterm infants.

Finally, the **fifth study** (Chapter 6) examined the effectiveness of hospital-based Video Interaction Guidance (VIG) after preterm birth. That is, a preventive video-feedback intervention to support the early parent-preterm infant relationship. A multicenter Randomized Controlled Trial (RCT) was designed to study the effect of VIG on parental interactive behavior, bonding, stress, and psychological wellbeing at baseline, mid-intervention, 3-week, 3-month, and 6-month follow-ups. Data were analyzed on an intention-to-treat basis, using multilevel modeling and analyses of covariance. VIG proved to be effective in enhancing sensitive behavior and diminishing withdrawn parental behavior. Though, these intervention effects were relatively short term and dissipated after three weeks. Additional analyses revealed positive effects on feelings of parental bonding, especially for fathers. Furthermore, the analyses also confirmed the significant role of traumatic experiences in the mother-infant relationship. For these mothers who perceived the preterm birth as a traumatic event, VIG appeared particularly beneficial. On the other hand, however, VIG failed to ameliorate explicit negative and intrusive parental behaviors. Moreover, parents' self-reported intensity of emotions, such as symptoms of depression, anxiety, anger, and infant related distress and worry, were unaffected by the intervention. In other words, the negative feelings and concerns that typically accompany preterm birth do not seem to diminish by VIG.

GENERAL CONCLUSION

The studies presented in this thesis contribute, at least to some extent, to a better understanding of the relation between preterm birth and parenting quality. Based on the results, several general conclusions can be drawn.

The impact of preterm birth on the quality of parenting

Regarding the first aim of this thesis, the results confirm that preterm birth entails inherent difficulties and worries for most parents. Parents of moderately and very preterm infants often suffer from significant distress during their infant's hospitalization and after discharge. The lower the gestational age of the infant, the more negative parents' postpartum experiences were, and the more stressful the situation was experienced by parents. Nevertheless, whilst earlier studies linked negative parental postpartum experiences and distress to poor parenting, these associations appeared not to be as straightforward in case of preterm birth.

Prematurity of the infant is often held to be an important explanation in the development of suboptimal parenting. Yet the present findings indicate that preterm birth does not automatically provide a context for the development of maladaptive outcomes. Immaturity of the infant, concerns about the infant's health and development, and adverse conditions surrounding preterm birth do not seem to necessarily predispose parents to poor parental behavior. Correspondingly, heightened levels of maternal distress after preterm birth do not necessarily place mothers at increased risk for insensitive behavior or negative thoughts and feelings about the infant. It was found that prematurity may actually even stimulate parental care. Although significant heterogeneity exists, the present findings suggest that most parents are quite capable of developing a compensatory caretaking style in which they adjust their parenting behavior to the needs and capacities of their preterm infant.

The predictive value of parent, infant, and contextual factors for poor parenting

With regard to the second aim of the thesis, the results suggest that parental characteristics exert a greater impact on the quality of parenting than do infant characteristics. This accounts for parents of term as well as preterm infants. This is in accordance with a meta-analysis by Van IJzendoorn et al. (1992) who showed that in clinical samples, the mother plays a more important role than the infant in shaping the quality of their relationship. Maternal problems (such as mental illness) were found to have a stronger effect on attachment than infant problems (such as prematurity). Also in our studies, infant medical risk and contextual risk factors associated with preterm birth were found to be less relevant and influential compared to parental risk factors during the postpartum period. In particular,

parental negative and unrealistic perceptions regarding the infant and their situation were associated with parental intrusive and/or disengaged behavior toward the infant, as well as with the development of parent-infant disrupted attachment. High-risk parents were largely characterized by their insensitive behavior toward the infant, unrealistic expectations regarding the infant's development, low levels of perceived social support, and features of disorganization in their narratives. Moreover, cumulative risk was frequently indicated in vulnerable families. The risk factors that seemed to be associated with disruptions in parenting included low parental education, a history of psychiatric problems, family disruption, and domestic violence. These findings once more demonstrate that adverse trajectories of parent-infant interaction can take root in families facing multiple constraints (MacKenzie, Kotch, & Lee, 2011). It is likely that prematurity of the infant adds to risk in families that are already predisposed to suboptimal outcomes. It seems, however, unlikely that the infant's biological risk and stressors related to the preterm birth play a significant role in the etiology of poor parenting.

The effectiveness of Video Interaction Guidance after preterm birth

Concerning the third and final aim of the thesis, it can be concluded that hospital based VIG has a short-lived but still possibly clinically relevant effect to support the early parent-infant relationship after preterm birth, in particular for fathers, and for mothers with traumatic birth experiences. However, the results suggest that an intervention with an exclusive focus on positive interactional behavior may not meet the specific needs of parents with serious parenting issues. Parents' high levels of negativity, intrusiveness, or psychological distress are not reduced by offering a preventive video feedback interaction immediately after birth. An additional intervention, specifically aimed at addressing the negative behaviors and high levels of distress is suggested as a complementary intervention.

Given the short-term effect of VIG, and our previous observation that the majority of parents with a preterm infant appear quite capable of parenting their infant, it may seem redundant to intervene in this specific population. Nevertheless, the promotion of sensitive and responsive caregiving after preterm birth may be of great importance, especially considering the vulnerability of preterm infants, and the fact that the parent-infant relationship is the conduit through which infants experience the hospital environment. Premature infants undergo hospitalization at an essential developmental phase, a time when they are very susceptible to external conditions (Leckman et al., 2004; Van den Berg, 2008). High quality parental care and handling, including emotional involvement and sensitive interactions, can help these infants to manage their distress and regulate their behavior during invasive medical procedures. In the long run, the quality of parenting can even buffer or exacerbate the impact of perinatal risk factors on the development of infants born preterm (Zeanah & Zeanah, 2009).

It is important to note that because the effectiveness VIG was studied only among parents of preterm infants, it is not clear whether the results might, or might not, pertain to a more general population. Perhaps certain groups of parents of infants born at term gestation would benefit from VIG as well. Further research into the generalizability of the intervention effects would be welcomed.

STRENGTHS AND LIMITATIONS

The studies presented in this thesis have a number of strengths that increase the confidence that can be placed in the findings, but some limitations need to be addressed. The strengths include the prospective and longitudinal design of the study, the randomized and controlled design of the trial, the inclusion of both mothers and fathers, the relatively large sample size (N = 231 mothers, 223 fathers, and 231 infants), the availability of a reference group of term infants, the relatively low attrition rate (approximately 8%), the sophisticated analyses of the data, and the use of multi-method and multi-informant (self-report, interview, and observational) measures to evaluate parenting quality from different angles.

Next to these strengths, several considerations need to be taken into account. First, families with a preterm infant were allocated to the intervention or control group, with only the experimental group receiving VIG during the first week after birth. This may have obscured the true differences in parenting between parents of term and preterm infants. To prevent this confounding issue by VIG, the effect of the intervention was examined in all observational studies. The analyses were subsequently carried out with VIG as a control variable when significant. The outcomes of the observational studies presented in the present thesis were not affected by the intervention. Second, the possibility that a selection bias might have influenced the results cannot be excluded. Preterm birth is generally associated with high-risk socio-demographic characteristics. Yet our sample consisted of disproportionately highly educated, socioeconomically advantaged parents (e.g., approximately 49% completed senior vocational or academic training). This may limit the generalizability of the findings to high-risk populations. Third, the studies addressing the impact of preterm birth on parenting were observational in nature and therefore cannot prove causality. For obvious reasons, parents were not, and could not have been, randomly assigned to either a term or preterm birth condition. It is therefore necessary to remain cautious when inferring causal effects from the associations. Maybe the very same risk factors of preterm birth, also may have negative effects on parents. Fourth, we cannot rule out the possibility of a social desirability bias to parents' responses and behavior. Fifth, despite the effort to control for potential confounders, it is possible that a residual confounding bias exists. Future studies are needed to further elucidate and validate our findings.

IMPLICATIONS FOR CLINICAL PRACTICE

The results of this thesis are not solely of scientific interest, but may also be clinically relevant. The results of our studies gave rise to the following recommendations for practice.

Identifying families at risk of poor parenting

The findings first of all prompt a rethinking of the implicit assumption that preterm birth affects parents' quality of caregiving. Not prematurity per se, but particularly parental display of very insensitive or intrusive behavior toward the infant, as well as the early presence of parental negative and unrealistic perceptions of the infant and the context, may be alarming to professionals working with families. Preterm birth in itself does not seem to place the parent-infant relationship at risk, but along with other risk factors (e.g., poor financial resources, low social support) the situation may impact on parenting. It is therefore important that clinicians consider psychosocial and socioeconomic risk factors that parents bring to their parenting, so that an appropriate psychological and/or parenting intervention can be offered. In families facing multiple constraints, interviews and observations may be better screenings methods than questionnaires to differentiate between high and low risk parenting situations. Along with other measures, the CLIP may be a practical and easy accessible tool to identify families in need of support after both term and preterm delivery.

Furthermore, clinicians should keep in mind that symptoms of postpartum depression, anxiety, and post-traumatic stress are to some degree normal psychological responses to the experience of preterm birth. Leaving aside extreme cases in which parents experience severe distress and unrealistic concerns, these negative feelings might, however painful to parents, help them to come to terms with the reality of having an immature hospitalized infant. This raises the question whether distress questionnaires designed to identify high-risk families should employ similar cut-off thresholds in both term and preterm populations. In addition, one may wonder whether interventions aimed at diminishing distress caused by the early birth experience are always beneficial to the parent-infant relationship.

Moreover, it is important that clinicians consider heterogeneity in parents' emotional responsivity to the event of preterm birth. Whilst heightened levels of distress seem inherent to preterm birth, a substantial amount of parents have only few concerns about their infant and experience very little distress. Clinicians should be aware of the evidence that the absence of negative emotions, distress, and concerns in parents does not guarantee adequate parenting. Moreover, they should use caution when interpreting the results of measures that capture parents' emotional responses to preterm birth. Because well-being and distress are generally held to be mutually exclusive, and distress questionnaires only have established cut-off thresholds at the high ends of the scales, the lack of parental distress and worries may impart a false sense of security. When parents respond with seeming indifference to the situation of very preterm birth, this should be a serious warning signal.

Implementation of Video Interaction Guidance

The results of the intervention study demonstrate that implementation of VIG in maternity wards and NICUs may be useful to support parents with a preterm infant. Because preterm infants are very susceptible to suboptimal parenting and less developmentally resilient than infants born at term gestation (Poehlmann & Fiese, 2001; Zeanah & Zeanah, 2009), VIG should be considered as a non-intrusive and relatively low-cost standard care option for parents of infants born preterm. However, given that the magnitude of benefit varies across parents, and that most parents of preterm infants seem quite capable of providing nurturing care, VIG should perhaps be directed at specific groups of parents. Our findings may justify baseline screening on maternal trauma, as VIG was found to be particularly beneficial for a subset of mothers who experienced the preterm birth as very traumatic. Furthermore, it is shown that fathers who have difficulty bonding with their infant may profit from an intervention that encourages parental awareness of and responsiveness to infant cues and behavior. When administering VIG, it is worth to include the mother-father-infant triad in the intervention if possible. It is important to note, nonetheless, that when parents' behavior is characterized by high levels of intrusiveness or when they experience severe psychological distress, VIG alone does not suffice to support parents. In families facing multiple stressors VIG should be complemented with other types of psycho-social support in order to address a wider range of problems.

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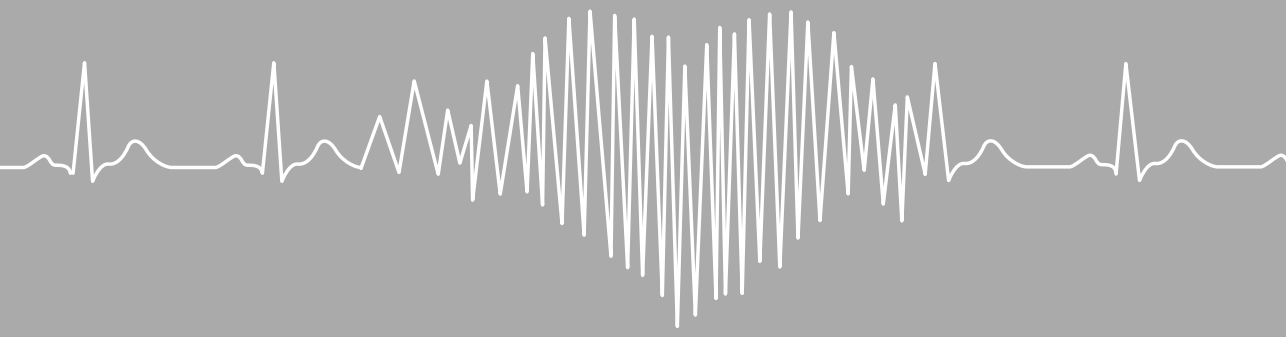
APPENDICES



NEDERLANDSE SAMENVATTING

Summary in Dutch

INTRODUCTIE

In Nederland komen per jaar ruim 13.000 kinderen (ongeveer 8% van alle pasgeborenen) vóór de 37e zwangerschapsweek ter wereld. Hoe vroeger een baby geboren wordt, hoe groter het risico op ernstige, zelfs levensbedreigende, complicaties, alsmede lichamelijke handicaps, verstandelijke beperkingen, ontwikkelings- en gedragsproblemen. Bovendien wordt vroeggeboorte regelmatig gelinkt aan het ontstaan van problemen in de ouder-kind relatie en aan ouderlijk disfunctioneren, waaronder hechtingsproblematiek tussen ouder en kind en negatief (intrusief of juist afstandelijk) interactiegedag van de ouder. Prematuriteit van het kind wordt zelfs in verband gebracht met een groter risico op kindermishandeling en verwaarlozing (zie bijvoorbeeld Spencer, Wallace, Sundrum, Bacchus & Logan, 2006). Echter, het exacte verband is hierbij onduidelijk en omstreden.

Het is bekend dat de vroeggeboorte van een baby voor ouders een zeer ingrijpende en emotionele gebeurtenis is, die vaak gepaard gaat met gevoelens van bezorgdheid, angst, stress, en frustratie. In veel gevallen worden aanstaande ouders compleet overvallen door de premature bevalling en vervolgens geconfronteerd met grote zorgen en onzekerheid over de overlevingskansen, gezondheid en toekomst van hun kind. Daarnaast krijgen ouders te maken met omstandigheden die het lastig maken om een normale ouderrol te vervullen. Zo brengt een te vroeg geboren baby zijn eerste levensdagen, -weken of -maanden door op de couveuseafdeling van een ziekenhuis, waardoor ouder en kind regelmatig gescheiden zijn van elkaar. Verder kan de interactie tussen ouder en kind worden verstoord omdat te vroeg geboren baby's meer moeite hebben met contact maken, sneller geprikkeld raken en vaak meer huilen in het eerste half jaar na de geboorte.

Het is niet bekend of deze negatieve emoties van ouders en stresserende omstandigheden die inherent zijn aan vroeggeboorte daadwerkelijk een rol spelen bij het ontstaan van problemen in de hechtingsrelatie en de interactie tussen ouder en kind. Hoewel veel onderzoek wordt uitgevoerd naar de gevolgen van prematuriteit op de ontwikkeling van kinderen op verschillende domeinen, is er relatief weinig wetenschappelijke aandacht voor de impact die een vroeggeboorte heeft op de kwaliteit van ouderschap en de ouder-kind relatie.

DOELSTELLINGEN

Het doel van dit onderzoek was drieledig:

1. Bepalen van de impact van een vroeggeboorte op de kwaliteit van ouderschap.
2. Verkrijgen van inzicht in de voorspellende waarde van ouder-, kind- en contextuele factoren voor ouderlijk disfunctioneren, na zowel à terme geboorte als na vroeggeboorte.
3. Evaluatie van de effectiviteit van Video Interactie Begeleiding in de ziekenhuissetting, bij ouders van prematuur geboren kinderen.

OPZET VAN HET ONDERZOEK

Het proefschrift bestaat uit vier observationele studies (Hoofdstukken 2, 3, 4 en 5) die gericht zijn op de eerste en tweede doelstelling en een experimentele studie (Hoofdstuk 6) die gericht is op de derde doelstelling van het onderzoek. De onderzoeksresultaten zijn gebaseerd op een steekproef van 231 moeders en 223 vaders van 81 à terme geboren kinderen (zwangerschapsduur van 37 weken of meer), 75 matig prematuur geboren kinderen (zwangerschapsduur tussen de 32 en 37 weken) en 75 extreem prematuur geboren kinderen (zwangerschapsduur van minder dan 32 weken), die werden geworven in acht Nederlandse ziekenhuizen. De deelnemende gezinnen werden gevolgd vanaf de geboorte tot zes maanden postpartum. Om de kwaliteit van ouderschap, i.c. de ouder-kind band, gehechtheid en interactiegedrag van de ouder, te onderzoeken is in de studies gebruik gemaakt van verschillende variabelen en onderzoeksmethoden. De kwaliteit van de band tussen ouder en baby werd gemeten door middel van vragenlijsten en een visueel instrument, de gehechtheidsrepresentaties (d.w.z. de ideeën en verwachtingen) die ouders hebben over hun baby werden beoordeeld met behulp van interviews en het interactiegedrag van ouders werd beoordeeld op basis van video-observaties. Tevens werd door middel van vragenlijsten, medische dossiers en interviews informatie verkregen over kind-, ouder- en omgevingskenmerken, alsook de ervaringen, percepties, emoties en ervaren stress van ouders in de periode direct na de geboorte.

SAMENVATTING VAN DE STUDIES

Vroeggeboorte en de ontwikkeling van een ouder-kind band

In de eerste studie (Hoofdstuk 2) is de ouder-kind relatie onderzocht vanuit een evolutionair perspectief. Hierbij werd specifiek gekeken naar de ontwikkeling van de band tussen ouder en baby gedurende de eerste maand na de geboorte. Vanuit evolutionair oogpunt is de ontwikkeling van een affectieve relatie tussen ouder en kind een geleidelijk proces dat afhankelijk is van verschillende kind- en omgevingskenmerken. Vooral ouders die de beschikking hebben over meerdere bronnen van steun, goede medische zorg en minder eigen problematiek ervaren zullen gemiddeld meer liefde, tijd en energie investeren in een kwetsbaar kind, teneinde de kans op goede uitkomsten voor het kind te vergroten. Uit de resultaten van de huidige studie en de longitudinale analyses bleek de band tussen moeder en baby sterker te worden na zowel een matige als extreme vroeggeboorte, terwijl de band die vader ervaart met zijn baby alleen sterker wordt na een extreme vroeggeboorte. In Nederland, een welvarend land met voldoende middelen, lijken ouders van prematuur geboren kinderen zelfs gemiddeld sterkere gevoelens voor hun baby te ontwikkelen in de postnatale periode dan ouders van op tijd geborenen.

Ouderschap onder complexe omstandigheden

In de tweede studie (Hoofdstuk 3) is onderzocht of er aspecten zijn rondom een vroeggeboorte die leiden tot negatief interactiegedrag van ouders een half jaar na de geboorte (i.c. insensitief, intrusief en/of afstandelijk gedrag). Om deze vraag te beantwoorden werden een maand na de geboorte door middel van een klinisch interview verschillende ouder-, kind- en contextuele factoren en ervaringen over het verloop van de zwangerschap, de bevalling, de kenmerken van het kind, de ziekenhuisopname en de steun die ouders uit hun netwerk kregen in kaart gebracht. Geconstateerd werd dat ouders van premature kinderen, in vergelijking met ouders van à terme geboren kinderen, meer negatieve ervaringen en zorgen hadden in de eerste maanden na de geboorte. Daarnaast lieten vaders van te vroeg geboren kinderen zes maanden na de geboorte wat minder sensitief en afgestemd en wat meer intrusief en negatief interactief gedrag zien. Uit nadere analyses bleek echter dat deze negatieve gedragingen niet verklaard konden worden door de vroeggeboorte op zich. Opmerkelijk was dat niet de stressvolle omstandigheden rondom de vroeggeboorte, noch de ziekenhuisopname, noch de zorgen die ouders hadden over de gezondheid en toekomst van hun kind, dit minder adequate gedrag van ouders voorspelden. Bij zowel ouders van à terme als prematuur geboren kinderen, bleken vooral negatieve en onrealistische percepties het negatieve gedrag in de interactie met hun baby te verklaren. Meer specifiek: het bleek dat ouders met onrealistische verwachtingen van de toekomstige ontwikkeling van hun kind, lage niveaus van ervaren sociale steun, een initiële negatieve reactie op de zwangerschap en kenmerken van desorganisatie, minder sensitief, meer intrusief en meer afstandelijk gedrag vertoonden ten opzichte van hun baby.

Negatieve postnatale emoties en de kwaliteit van ouderschap

De derde studie (Hoofdstuk 4) was gericht op negatieve emoties bij moeders in de postpartum periode. Aangezien eerder onderzoek had aangetoond dat moeders met symptomen van postnatale depressie, angst en post-traumatische stress (PTSS) meer problemen hebben in de omgang met hun baby, werd onderzocht of verhoogde niveaus van negatieve emoties na vroeggeboorte verband houden met negatief interactiegedrag en verstoorde ideeën en verwachtingen van moeders over hun baby. De resultaten lieten in de eerste plaats zien dat moeders van prematuur geboren kinderen in de postpartum periode gemiddeld meer depressieve symptomen en angstklachten hadden en meer PTSS symptomen ervoeren dan moeders van à terme baby's. Er bleek echter aanzienlijke heterogeniteit te bestaan in hun emotionele responsiviteit. Op basis van de niveaus van negatieve emoties (i.c. depressie, angst en PTSS symptomen) en ouderschapskwaliteiten (i.c. interactiegedrag en gehechtheidsrepresentaties) van moeders konden vijf subgroepen worden onderscheiden. De eerste groep (47%) van moeders werd gekenmerkt door weinig

negatieve emoties en goede ouderschapskwaliteiten, de tweede groep (20%) door weinig negatieve emoties en een lage kwaliteit van ouderschap, de derde groep (22%) door veel negatieve emoties en een middelmatige kwaliteit van ouderschap, de vierde groep (9%) door veel negatieve emoties en goed ouderschap en tenslotte de vijfde en kleinste groep (2%) door extreem veel negatieve emoties en een zeer lage kwaliteit van ouderschap. Opmerkelijk was dat klinische niveaus van negatieve emoties bij moeders niet noodzakelijk gepaard gaan met onvoldoende ouderschapskwaliteiten en vice versa. Het ervaren van veel negatieve emoties na vroeggeboorte lijkt het risico op problemen in het ouderschap niet te vergroten. Omgekeerd lijken lage niveaus van negatieve emoties niet noodzakelijkerwijs een hoge kwaliteit van ouderschap te impliceren. Er lijkt eerder sprake te zijn van een curvilineair verband, in die zin dat gemiddeld tot hoge niveaus van depressie, angst en PTSS symptomen na vroeggeboorte samen gaan met een optimale kwaliteit van ouderschap, terwijl de uitersten van (d.w.z. zeer lage (in het geval van extreme vroeggeboorte) of zeer hoge niveaus van negatieve emoties) gepaard lijken te gaan met afstandelijk en/of intrusief interactiegedrag en afstandelijke of verwarde gehechtheidsrepresentaties.

Vroege predictoren van gedesorganiseerde gehechtheid

De vierde studie (Hoofdstuk 5) beschrijft een onderzoek naar vroege predictoren van gedesorganiseerde (*disrupted*) gehechtheidrepresentaties (of interne werkmodellen) van ouders van à terme en prematuur geboren kinderen. Doel van dit onderzoek was het identificeren van risicogroepen aangezien eerdere onderzoeken hebben uitgewezen dat ernstig gedesorganiseerde gehechtheid van de ouder kan leiden tot zeer negatief en zeer atypisch ouderlijk gedrag. Dit kan vervolgens weer kan leiden tot psychopathologie en ontwikkelingsstoornissen bij kinderen. Op grond van vader-, moeder- en kindvariabelen gemeten op één maand postpartum, werden voorspellende factoren geïdentificeerd en risicoprofielen opgesteld voor de ontwikkeling van gedesorganiseerde representaties van ouders op zes maanden postpartum. De analyses toonden aan dat geen van de aan prematuriteit gerelateerde variabelen (zoals de immaturiteit van het kind, de zorgen van ouders over de gezondheid en toekomst van hun kind en de postnatale negatieve emoties van ouders) een samenhang vertoonden met de ontwikkeling van gedesorganiseerde gehechtheidsrelaties tussen ouder en baby. De aanwezigheid van negatieve en onrealistische verwachtingen en percepties van ouders ten aanzien van hun baby en de situatie, evenals insensitieve en intrusieve interactieve gedragingen van ouders, bleken daarentegen wel sterk voorspellend te zijn voor de ontwikkeling van gedesorganiseerde gehechtheid bij ouders van zowel à terme als prematuur geboren baby's.

Effectiviteit van Video Interactie Begeleiding na vroeggeboorte

De vijfde studie (Hoofdstuk 6) betreft een onderzoek naar de effectiviteit van Video Interactie Begeleiding (VIB) in de ziekenhuissetting, bij ouders van matig en extreem prematuur geboren baby's. VIB is een preventieve, gedragsmatige videofeedback interventie die onder meer wordt ingezet om de kwaliteit van de ouder-kind relatie te ondersteunen na vroeggeboorte. In een multicenter gerandomiseerd onderzoek met controlegroep (RCT) werd gedurende de eerste zes postpartum maanden geëvalueerd welke effecten VIB heeft op het interactiegedrag van ouders, de kwaliteit van de hechtingsrelatie tussen ouder en baby, alsook de ervaren psychologische stress van ouders en hun welbevinden. De resultaten toonden aan dat VIB in de eerste week na vroeggeboorte effectief is in het verhogen van sensitief gedrag en het verminderen van afstandelijk gedrag van ouders tijdens dagelijkse ouder-kind interacties. VIB bleek al na twee sessies te leiden tot een kleine gedragsverbetering bij moeders en een middelgrote gedragsverbetering bij vaders. Het interventie-effect was echter kortdurend en doofde na drie weken uit. Verder bleek VIB een positieve invloed te hebben op de kwaliteit van de ouder-baby band en relatie, met name voor vaders. Daarnaast bevestigden de resultaten van deze studie de rol van traumatische ervaringen als risicofactor voor problemen in de moeder-kind relatie. Moeders die de vroeggeboorte als zeer traumatisch hadden ervaren bleken namelijk meer problemen te hebben in de interactie en relatie met hun baby. Deze subgroep van moeders bleek in het bijzonder gebaat bij de VIB-interventie. Er werd bij hen een kortdurende, maar grote gedragsverbetering geconstateerd. VIB bleek daarentegen niet effectief in het verminderen van expliciet negatief en intrusief gedrag van ouders. Bovendien werden de aan prematuriteit gerelateerde zorgen, psychologische stress en negatieve emoties van ouders (zoals gevoelens van depressiviteit, angst en woede) niet beïnvloed door de interventie.

ALGEMENE CONCLUSIE

De studies die zijn gebundeld in dit proefschrift bieden inzicht in de impact van vroeggeboorte op de kwaliteit van ouderschap (i.c. de ouder-kind band, gehechtheid en interactiegedrag van de ouder) en in de voorspellende waarde van risicofactoren voor ouderlijk disfunctioneren gedurende de eerste zes postpartum maanden. In Hoofdstuk 7 worden de belangrijkste onderzoeksresultaten besproken. Tevens worden de methodologisch sterke en zwakke punten van het onderzoek belicht en mogelijke implicaties voor de praktijk gegeven.

Ten aanzien van de eerste doelstelling van het onderzoek *(bepaling van de impact van een vroeggeboorte op de kwaliteit van ouderschap)* kan worden gesteld dat de geboorte van een prematuur kind een zeer ingrijpende en belastende gebeurtenis is voor ouders. Hoe ernstiger de prematuriteit, hoe groter de zorgen zijn van ouders en hoe meer gevoelens van

depressiviteit, angst en post-traumatische stress zij gemiddeld ervaren. De resultaten van de verschillende studies laten echter ook zien dat deze zorgen en negatieve postnatale emoties bij ouders niet noodzakelijk leiden tot problemen bij het opbouwen van een band met hun baby of tot onvoldoende ouderschapskwaliteiten. Omgekeerd impliceert de afwezigheid van depressieve gevoelens, angst en stress bij ouders niet een afwezigheid van problemen in de ouder-kind relatie. Verder lijken de negatieve ervaringen van ouders en stresserende omstandigheden die inherent zijn aan vroeggeboorte (zoals de ziekenhuisopname van het kind) geen direct verband te houden met het ontstaan van hechtingsproblemen of negatief interactiegedrag van de ouder. In de meeste gevallen zijn ouders van te vroeg geboren kinderen goed in staat om, ondanks de vaak zeer complexe omstandigheden, een affectieve relatie op te bouwen met hun baby.

Ten aanzien van de tweede doelstelling *(verkrijging van inzicht in de voorspellende waarde van ouder-, kind- en contextuele factoren voor ouderlijk disfunctioneren)* blijkt dat risicofactoren op niveau van de ouder een grotere invloed hebben op de kwaliteit van ouderschap dan kenmerken van het kind en de context. De resultaten van de studies laten zien dat prematuriteit van het kind en de stressvolle situatie van vroeggeboorte niet noodzakelijkerwijs leiden tot ouderlijk disfunctioneren. Het blijkt dat ouders met een verhoogd risico op gedrags- en hechtingsproblemen in de relatie met hun baby met name gekenmerkt worden door negatieve en onrealistische percepties van hun baby en hun omgeving. Zij hebben vaak irreële verwachtingen van de toekomstige ontwikkeling van hun kind, lage niveaus van ervaren sociale steun en kenmerken van desorganisatie in hun denken en gedrag. Verder blijkt dat het interactiegedrag van ouders met serieuze (gedesorganiseerde) hechtingsproblemen reeds tijdens vroege ouder-kind interacties gekenmerkt wordt door insensitiviteit, intrusiviteit en/of afstandelijkheid. Dit geldt voor zowel ouders van à terme als prematuur geboren kinderen. De huidige studies bevestigen verder dat vooral bij een cumulatie van deze en de algemeen bekende risicofactoren (zoals huiselijk geweld, een laag opleidingsniveau of psychiatrische problematiek van een ouder) een zorgwekkende situatie kan ontstaan in de gezinssituatie. Met andere woorden: vroeggeboorte en prematuriteit van het kind lijken geen rol te spelen in de etiologie van ouderlijk disfunctioneren. Wanneer er in een gezin echter sprake is van een opeenstapeling van problemen, kan een vroeggeboorte de ouder-kind relatie verder onder druk zetten.

Ten aanzien van de derde doelstelling (*evaluatie van de effectiviteit van Video Interactie Begeleiding na vroeggeboorte*) kan worden gesteld dat VIB op de korte termijn succesvol is in het vergroten van de ouderlijke sensitiviteit en betrokkenheid, vooral bij vaders en bij getraumatiseerde moeders. Gezien het feit dat prematuur geboren baby's een vaak stressvolle ziekenhuisopname ondergaan gedurende de meest kwetsbare periode van hersenontwikkeling, lijkt het zinvol om een interventie aan te bieden die de sensitiviteit en het vermogen tot afstemming bij ouders vergroot tijdens het ziekenhuisverblijf. Wanneer er

bij ouders echter sprake is van extreme niveaus van stress en negatieve emoties of wanneer zijn of haar gedragingen worden gekenmerkt door negativiteit en intrusiviteit, lijkt VIB ter ondersteuning van de ouder-kind relatie niet afdoende te zijn.

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CURRICULUM VITAE

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