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**THE TRANSITION TO PARENTHOOD: A  
PROSPECTIVE STUDY OF PARENTAL MENTAL  
HEALTH, FAMILY RELATIONSHIPS AND INFANT  
DEVELOPMENT**

Ylva Margareta Parfitt

Thesis submitted for the degree of Doctor of Philosophy

University of Sussex

September 2013

**Statement**

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another University for the award of any other degree.

Ylva Margareta Parfitt

18<sup>th</sup> September 2013

## Acknowledgements

I would like to thank everyone who has supported me throughout the completion of the work for this Thesis. In particular I would like to acknowledge:

*The families taking part* - for so willingly sharing their experiences as new parents with me.

*Susan Ayers*, my main supervisor - for her continuous theoretical and practical guidance, support and encouragement. Her total commitment, enthusiasm and knowledge of the area of parental mental health have inspired me, far beyond the realms of this thesis.

*Alison Pike*, my co-supervisor – for her thorough knowledge and clear encouraging advice regarding statistical methods and family research.

*Liz Ford*, my fellow researcher - for always being ready to give advice and moral support.

*Angela de Mille* - for her assistance with the CARE index coding of the parent-infant interactions.

*Richard*, my husband, and our four children, *William, Emma, Louise and Alice*, – for giving me the motivation to do this work. You are the most important people to me in the world. Thank you for always giving me so much love and believing in me.

This research was partly supported by the British Academy Research Grant LRG - 45508

UNIVERSITY OF SUSSEX

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**THE TRANSITION TO PARENTHOOD: A PROSPECTIVE STUDY OF  
PARENTAL MENTAL HEALTH, FAMILY RELATIONSHIPS AND INFANT  
DEVELOPMENT****Summary**

The transition to parenthood involves psychological and social adjustments for men and women, with evidence of possible declines in mental health and close relationships. This thesis examined the relationship between parents' mental health (depression, anxiety, PTSD), the parent-infant relationship, couple's relationship and infant development. The five articles in this thesis were part of a prospective multi-method investigation of first-time parents. Parents completed questionnaires in late pregnancy, 3 months and 15 months postpartum (Article 3 & 4), detailed observations of parent-infant interactions 3 months postpartum (CARE-index; Article 4), in-depth interviews (Birmingham Interview of Maternal Mental Health) 5 months postpartum (Article 1 and 2), and infant development (Bayley Scales III) was examined at 17 months postpartum (Article 5).

Results showed that a proportion of men and women suffered from poor mental health. Mental health problems were more common in pregnancy than postpartum. Women experienced worse mental health than men, but few other gender or within couple differences were found (Articles 2 & 3). A relatively high rate of poor parent-infant interactions was found (Article 4) and many parents reported feelings of anger towards their infant (Articles 1 & 2). Parents' perceptions of their infant's characteristics were important for the parent-infant relationship (Article 3) and infant's cognitive, language and motor development (Article 5). Additionally, women's postpartum PTSD and prenatal depression were associated with poor infant development (Article 5). Men's mental health was associated with poor interaction with their infants (Article 4), negative perceptions of the father-infant and couple's relationship (Article 3). These findings suggest that both men and women should be included in early mental health and family relationship interventions. However, the small low-risk sample limits generalizability of results. Future research would benefit from exploring the links between parental, infant and family relationship variables further, over time in larger more representative samples.

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**List of Abbreviations**

APA	American Psychiatric Association
BIMMH	Birmingham Interview of Maternal Mental Health
DAS	Dyadic Adjustment Scale
DSM	Diagnostic and Statistical Manual
HADS	Hospital Anxiety and Depression Scale
ICQ	Infant Characteristic Questionnaire
NHS	National Health Service
PBQ	Postpartum Bonding Questionnaire
PND	Postnatal Depression
PTSD	Posttraumatic Stress Disorder
SEM	Structural Equation Modelling

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# **1 Literature Review for Thesis**

## **1.1 Introduction**

Pregnancy and the transition to parenthood is a period which entails a number of psychological and social changes and adjustments for parents (Genesoni & Tallandini, 2009; Gjerdingen & Center, 2003; Lorensen, Wilson & White, 2004; Lu, 2006; Morse Buist & Durkin, 2000; Nelson, 2003). Whilst becoming a parent is mostly viewed as a positive event (e.g., Green & Kafetsios, 1997), this time is also associated with increased vulnerability to mental health problems for men and women, such as depression, anxiety and post-traumatic stress in pregnancy and the postnatal period (e.g., Brockington, 2004; Oates, 2003; 2006).

Research evidence suggests that poor mental health, particularly maternal postnatal depression, is associated with lower quality of parent-infant relationship (for a review, see Field, 2010). However, other mental health issues, such as anxiety, have also been shown to have detrimental effects on the parent-infant relationship (e.g., Glasheen, Richardson & Fabio, 2010). The central importance of the development of a satisfactory and intimate mother-infant relationship has long been acknowledged (Bowlby, 1969; Klaus & Kennel, 1976) and recently the importance of fathers' contribution to family relationships has been recognised (Ramchandani et al., 2011). The birth of a child may also have a negative impact on the quality of the couple's relationship, as the dyadic couple becomes a triad (Bateman & Bharj, 2009). Adverse direct or indirect effects of parental mental health, mainly depression, on the child's subsequent cognitive, language and socio- emotional development has been found both for mothers (e.g., Murray, 2009; Murray et al., 2011) and fathers (Ramchandani et al., 2005; 2013).

Optimising mothers' and fathers' mental well-being and family relationships in the transition to parenthood is therefore crucial, not only for the parents themselves, but also in order to lay a good foundation for the child's future development, mental well-being and behaviours (Barlow, 2012). This has been recognised by a number of national policies and guidelines (e.g., Department of Health, 2004; National Institute for Health and Clinical Excellence, 2007; Cuthbert, Rayns & Stanley, 2011).

This thesis aims to examine the transition to parenthood in terms of men and women's mental health in pregnancy and postpartum, and how this relates to the couple's relationship, parent-infant relationship and child development. This chapter provides an overview of current research on parents' mental health during the transition to parenthood and its association with family relationships and child development. There are three sections in this chapter. The first considers relevant theories and conceptual frameworks that can be drawn on when studying the transition to parenthood. The second section summarises the research evidence on parental mental health and its associations with family relationships and child development. The final section presents the aims of the thesis and a brief summary of the studies included in the thesis.

## **1.2 Theories and Conceptual Framework**

There are several theoretical approaches that can inform and guide empirical research regarding the transition to parenthood for the parent, the couple and the baby. For example, individualistic models, such as the *diathesis-stress* model, could be used to understand why the transition to parenthood may lead to poor mental health in some people and not in others. Theories and concepts, such as those of *attachment* and *bonding* are relevant to research on early dyadic interactions between the parent and baby. *Family systems theory* emphasises the importance of viewing the family as a

whole. Ecological models suggest mechanisms by which multiple factors may influence each other, and contribute to the child's developmental outcomes. The relevance of these theories is partly dependent on the outcome variable of interest. Thus individualistic models may be used to inform our understanding of mental health, whereas ecological models may be more appropriate when examining child development. The sections below outline some of the models that may be useful when examining parental mental health, the parent-infant relationship and family relationships.

### **1.2.1 Mental health and parenthood**

Various psychological theories could be applied to gain a better understanding of the mechanisms regarding individual's differing susceptibility to develop mental health problems in the transition to parenthood period. Parental mental illness in the transition to parenthood is likely to be the result of complex interactions between psychological, social and biological factors. Psychosocial models, such as the *diathesis-stress model* (Burns & Machin, 2013; Simpson & Rholes, 2008), may thus be particularly useful for conceptualising why some parents who are subjected to certain stresses suffer from decreased mental health whilst others do not. This model suggests that an individual's vulnerabilities (diatheses) such as genetic predisposition or negative early life experiences and the social context (e.g., lack of social support) moderate the effect of a stressful life event (e.g., childbirth) on the person's mental health. It implies that the greater vulnerabilities a person has, the less stress is needed for the development of mental health problems. A version of the diathesis-stress model has been put forward in relation to postnatal PTSD (Ayers & Ford, in press) that includes the individual's appraisal processes in the explanation of whether a person will develop mental health problems as a result of childbirth or not.

### 1.2.2 The parent-infant relationship

*Attachment theory* asserts that a warm, intimate, continuous, satisfactory early relationship between a primary caregiver and the baby is essential for the child's future mental health and ability to relate to others (Bowlby, 1969, 1982). Bowlby argued that new-born babies are biologically predisposed to keep proximity to their care giver with behaviours that are aimed at attracting and maintaining attention. In situations of threat, such as a separation from the care giver, the baby's attachment behaviours are suggested to be activated in order to restore proximity to their care giver and reduce their sense of threat or discomfort. Bowlby emphasised the importance of optimizing the quality of the early baby-caregiver relationship, as he postulated that this contributes to the formation of an "internal working model", which the person then uses as a reference to predict and guide them in future relationships. He hypothesized that even though these could change when a person encounters new relationship experiences (e.g., Simpson, Rholes, Campbell, Tran & Wilson, 2003), these models largely remain stable throughout life, as people process incoming information in accordance with their internal working model. Studies based on the attachment theory have for example found cross-generational effects with consistent links among adults' working models of their own attachment, their behaviour as a parent and their children's attachment (Hautamaki, Hautamaki, Neuvonen & Maliniemi – Piispanen, 2010; Flykt, Kanninen, Sinkkonen & Punamaki, 2010; Rholes, Simpson & Friedman, 2006).

*Maternal sensitivity* is a central concept in attachment theory and has been recognised as one of the key factors in the quality of the mother-baby relationship and the baby's attachment security (De Wolff & Van Ijzendoorn, 1997; Kemppinen, Kumpulainen, Raita-Hasu, Moilanen & Ebeling, 2006). This concept can be defined as the mother's availability and alertness to her infant, in well-timed and consistent

responses to her infant's distress signals (Ainsworth, Blehar, Waters & Wall, 1978), and is seen as important in helping the infant to regulate their internal state and for the infant's psychological well-being (e.g., Waters, Crowell, Elliott, Cocoran & Treboux, 2002).

*The Dynamic Maturational Model* of attachment (DMM; Crittenden, 1995, 2006) is a more recent theory of attachment, grounded in the work of Bowlby and Ainsworth, which integrates theories of development and family systems (Crittenden & Dallos, 2009). The Dynamic Maturational Model specifies that a person uses self-protective attachment strategies to protect themselves from danger, as a result of the processing of two types of information: cognitive information about causal relations, and affective information (e.g., intensity of feelings within a specific context). This theory views attachment as a dynamic, bi-directional, changing process, where early childhood experiences are proposed to influence later development, but are not overly deterministic. The nature of threat changes with age as the individual faces more complex contexts at school and work, and matures neurologically and physically. Some individuals are viewed as mainly using cognition to guide their attachment behaviour, whilst Crittenden suggests that other individuals are biased to rely on the intensity of their feelings to organise their self-protective behaviours. Crittenden also suggests that the individual's process of mental representations is one way of explaining why individuals who experience similar stresses (e.g., childbirth) may react differently, as it is the representational process not the genes or experience per se that guides the individual's behaviour.

Whilst the term attachment usually refers to the bond that the infant develops for the parent, i.e., the parent-baby relationship viewed from the infant's perspective, the concept of bonding denotes the parent's affectionate bond to the infant, i.e., the

relationship seen from the parent's perspective, and has been used to label disorders of the parent-baby relationship by some researchers (e.g., Brockington, Aucamp & Fraser, 2006). These researchers assert that the psychological process of bonding between the parent and their baby is the most important aspect of becoming a parent. The concept of "bonding" was first identified by Klaus and Kennel (1976). Their bonding theory suggested that the parent-infant bond is a biologically driven process which develops between the parent and infant during a crucial "sensitive period", hours and days after the birth. This theory suggests that it is important for the mother and her infant to have optimal quality and amount of contact during this time, as a lack of an early intimate tie between the parent and infant may lead to deleterious consequences for the baby's development, and both the infant's and parent's behaviour and mental health (e.g., Bor, Brennan, Williams, Najman & O'Callaghan, 2003; Myers, 1984). Such consequences include cognitive deficits (e.g., Murray, Hipwell, Hooper, Stein & Cooper, 1996) and infant-mother attachment problems (e.g., Ainsworth et al., 1978).

It is now acknowledged that the bonding process often starts in pregnancy, and that parental representations of the unborn child may influence their postpartum relationship, with unplanned pregnancy and poor bonding to the foetus being risk factors for an impaired postpartum bonding (e.g., Brockington, Aucamp & Fraser, 2006; Dollberg, Feldman & Keren, 2010; Siddiqui & Hagglof, 2000). Also, the bonding process is viewed as developing throughout the postnatal period, not just within the first hours and days. In fact, findings from an early interview study indicated that many mothers felt initial tiredness and distance from their baby during the first 3 – 4 weeks, with positive feelings growing steadily in the weeks and months after that (Robson & Moss, 1970; see Muzik et al., 2013, for a recent replication). Neurobiological evidence suggests that the infant's smile is an important catalyst for activation of dopaminergic

reward-related brain regions (Strathearn, Li, Fonagy & Montague, 2008), and that the release of the hormone oxytocin aids the neurological bonding process in the parent (Giustardi, Stablum & De Martino, 2011; Strathearn, Fonagy, Amico & Montague, 2009).

Brockington, Aucamp & Fraser (2006) characterize a bonding disorder as parents' persistent negative emotional response to their baby, accompanied by pathological anger, which can ultimately result in child abuse. Other symptoms include rejection of the baby, lack of interaction, wishes that the baby would disappear, and feelings of being trapped. Both the parent and infant contribute to the parent-infant relationship. Apart from parental factors such as variations of sensitivity, the infant's temperament may particularly affect the parent-infant interaction and consequently the infant's attachment security (Braungart-Rieker, Garwood, Powers & Wang, 2001; Goldsmith & Alansky, 1987). For example, a difficult temperament in the infant, with expression of negative emotions (Campbell, Cohn and Meyers, 1995), could negatively affect the parent-infant interaction by inducing a vicious circle of mutual rejections between the parent and baby. Rothbart (2007) defines temperament as individual differences in a child's emotional, motor and attentional reactivity and self-regulation. Research suggests that although certain temperamental characteristics are relatively stable across time (e.g., Canals, Hernandez-Martinez & Fernandez-Ballart, 2011; Komsí et al., 2006; Pesonen et al., 2003), temperament is not just genetically determined, but may change as part of maturation and that it can be affected by and affect the environment (e.g., through parenting). For example, Pauli-Pott, Mertesacker, Bade, Haverkock & Beckmann (2003) found that parents' perceptions shaped their children's temperament, whilst Solmeyer & Feinberg (2011) found an interaction between temperament and parenting.



*The transactional model* of child development (Sameroff, 2010; Sameroff, McDonough & Rosenblum, 2004) could be useful to consider in the context of the parent-infant relationship as it views development as a product of a dynamic bi-directional, reciprocal process over time, where child characteristics (“nature”) both influence and are influenced by the child rearing context, such as parental caregiving (“nurture”). Sameroff et al. (2004) gave an example of this, with birth complications leading to anxious handling by the parent, resulting in poor self-regulation and difficult temperament in the infant, causing parental disengagement and consequently poor language and social skills for the child. Sameroff and Fiese (2000) thus suggest that interventions could be targeted at the child, the child-rearing environment, or the relationship itself.

Generally, researchers need to explicitly state which aspect of a certain variable they are using, as this may affect the findings and conclusions. The term “parent-infant relationship” is a broad term that can include both parent and infant measures of the relationship. As mentioned above, the term “parent-baby bond” generally refers to the bond that the parent has for their child, usually measured by self-report parent baby bonding questionnaires (e.g., PBQ; Brockington, Fraser & Wilson, 2006), whilst “infant attachment” usually denotes the type of attachment pattern that the infant has to the parent, usually measured through the Strange Situation Technique (Ainsworth et al., 1978). On the other hand, observational measures, such as the CARE index, include both infant and parent interactional behaviours (Crittenden, 2004). Walsh (2010) recently discussed the importance of clarifying terminology in relation to definitions of maternal fetal relationships, distinguishing “attachment” as concerning care seeking behaviours, whilst distinguishing “bond” to be related to caregiving behaviours. The precise definitions and choice of measures for parental, child and relationship variables

may thus potentially influence the results and interpretations of the findings. In the current thesis, the parent-infant relationship measures mainly examined the parent – infant bond and the interactional aspects of the parent-infant relationship, not infant attachment.

### **1.2.3 Family systems**

It is not just the dyadic parent-infant relationship or individual parent or infant factors that are important for understanding the development of the child. This needs to be set in the context of the family as a whole. Evidence shows interrelatedness between the couple's relationship and the parent-baby relationship, with "spillover" effects between these two subsystems (Erel & Burman, 1995 for a meta-analysis; Florsheim & Smith, 2005). Typical findings are that the more negative the couple's relationship quality, the worse the parent-baby relationship and vice-versa (Carlson, Pilkauskas, McLanahan & Brooks-Gunn, 2011; for reviews see Krishnakumar & Buehler, 2000; Owen & Cox, 1997).

Minuchin (1985) originally highlighted the importance of seeing the family as a system, where the whole is seen as more than the sum of its parts, for understanding the child's psychological and social development. This perspective can be helpful for understanding how family members affect other members both directly and indirectly over time. For example, one partner's mental health problems will potentially affect the other partner's mental wellbeing, as well as the parent-baby interaction and wellbeing of the child (Goodman, 2004). Optimal child outcomes are linked to sensitive parenting by both parents (Ryan, Martin & Brooks-Gunn, 2006) and protective effects have been found if at least one parent shows sensitive interactions with the baby (Mezulis, Hyde & Clark, 2004). Many recent studies have been guided by the family systems perspective with increasing focus on both parents' effects on the child and the vital role of the father

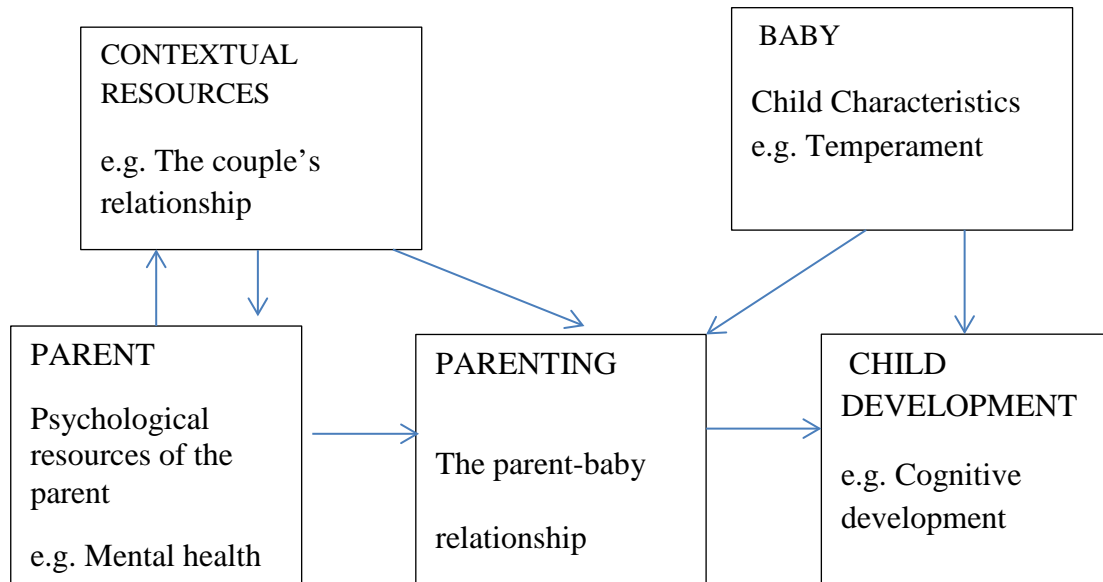
within the family (e.g., Bell et al., 2007; Boyce, Condon, Barton & Corkindale, 2007; Fivaz-Depeursinge, Favez, Lavancy, De Noni & Frascarolo, 2005).

#### **1.2.4 Belsky's process model**

The evidence of intra-familial and environmental influences on the early parent-infant relationship means the process model of the determinants of parenting (Belsky, 1984) is a useful framework for considering a number of important factors which influence the parent-baby relationship. This ecological model was developed to explain individual differences in parenting in order to understand both the normal range of parental behaviour as well as the etiology of child maltreatment. Belsky proposed that there are three determinants of parenting, with the psychological resources of the parent being the most important. This determinant includes *parental factors* (e.g., mental health, adult attachment style and parent's developmental history). The second determinant concerns the *baby's contributions* and includes characteristics of the baby such as temperament. Many authors have suggested that it is not the child's characteristics per se that influence parenting, but rather the "goodness of fit" between the parent and child (Belsky 1984; Thomas & Chess, 1984). The third and final determinant consists of contextual sources of stress and support, with the couple's relationship seen as the principal support system. Here also, Belsky suggests that it is the goodness of fit between desired support and received support that matters. Additionally, Belsky's model (Figure 1.1) indicates that the main direct influences on the child's development are parenting (parent-baby relationship) and the child's characteristics, with the other determinants having indirect effects, mediated by parenting.

**Figure 1.1 Belsky's process model of parenting (1984).**

Adapted and simplified version.



The various relevant theories and models briefly outlined in the above section are useful for guiding researchers' understanding of the transition to parenthood period. The following section presents a summary of research related to parental mental health, family relationships and child outcomes in the transition to parenthood period.

### **1.3 Parental Mental Health**

#### **1.3.1 Diagnosis**

Women's mental health in the transition to parenthood has been extensively studied and it has been shown that perinatal psychopathology can take many forms with problems ranging from transitory symptoms, such as baby blues (Henshaw, 2003) to extremely rare and severe affective illness such as postpartum psychosis, with symptoms of delusions and hallucinations (e.g., Brockington, 2000; Seyfried & Marcus, 2003), with incidence rates of one woman per 1000 births (Brockington, 2004).

Depression, particularly maternal postnatal depression, is the most well recognised and researched mental health problem during the perinatal period. The Diagnostic and Statistical Manual for Mental Disorders, the fourth edition (DSM-IV-TR, American Psychiatric Association, 2000<sup>1</sup>), defines postpartum depression as a major mood disorder with postpartum onset, which falls between baby blues and psychosis. Experiencing of depressed mood all day, most days and marked diminished interest in most activities are main criteria for this, with additional criteria of other symptoms such as loss of energy, decreased appetite and insomnia. Other typical symptoms for depression in pregnancy or in the postpartum period are persistent sadness, reduced ability to experience pleasure, irritability, fatigue. These symptoms are similar to those observed in depression experienced at other times of life (e.g., Murray, Cooper & Hipwell, 2003; Wee, Skouteris, Pier, Richardson & Milgrom, 2011)

Anxiety is another mental health disorder which can occur during the transition to parenthood (Matthey, Barnett, Howie & Kavanagh, 2003; Wenzel, Haugen, Jackson & Brendle, 2005). The DSM-IV-TR (APA, 2000) sub-categorises anxiety disorders into generalized anxiety disorder, panic disorder, phobias, obsessive compulsive disorder and posttraumatic stress disorder. Puerperal panic disorder is characterised by extreme fear and anxiety and may include fear of harming the baby or an intense lack of confidence in the parental role combined with physical symptoms such as breathing difficult or palpitations (Brockington, 1996). General anxiety disorder (GAD) refers to more generalised non-specific persistent fear exemplified by excessive worrying or vigilance about the infant's health or feeling generally overwhelmed in the parental role,

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<sup>1</sup> Although the DSM has recently been updated to DSM-5 (APA, 2013), this thesis was carried out at the time of DSM-IV. Therefore information on diagnostic criteria and prevalence rates throughout this thesis are based on DSM-IV-TR criteria.

whilst phobias are triggered by specific stimulus or situations, such as phobic avoidance of the infant (Brockington, 1996).

There is increasing evidence that women may also develop post-traumatic stress (PTSD) as a result of childbirth (e.g., Ayers & Pickering, 2001; Leeds & Hargreaves, 2008; for a review see Olde, van der Hart, Kleber & Van Son, 2006). PTSD has historically been categorised as an anxiety disorder which results from a traumatic experience. The Diagnostic Statistical Manual of Mental Disorders (DSM- IV-TR, APA, 2000) states that for a diagnosis of PTSD people have to experience an event in which there was perceived threat of severe injury and death or severe threat to the integrity of the person or significant other, and a response of intense fear, helplessness and horror. PTSD symptoms include intrusive re-experiencing of the event (e.g., nightmares and flashbacks of the birth), persistent avoidance of reminding factors (e.g., avoiding new pregnancy) and hyper-arousal (e.g., sleep disturbances, irritability, concentration difficulties). A clinical diagnosis of PTSD requires that symptoms last more than a month after the event and cause significant distress and impairment.

### **1.3.2 Prevalence**

Postpartum depression prevalence rates range from 8 to 28% in women (e.g., Buist et al. 2008; Gavin et al., 2005; O'Hara & Swain, 1996). Prevalence rates of maternal depression during pregnancy are also of a similar magnitude to postpartum depression, with rates ranging from 10% to 20% (e.g., Leigh & Milgrom, 2008; Melville, Gavin, Guo, Fan & Katon, 2010; Milgrom et al., 2008) amongst expectant mothers. Most research has focused on maternal depression and epidemiological research suggests that women are more likely to suffer from mental health problems during the transition to parenthood than men (e.g., Correia & Linhares, 2007; Edhborg,

Matthiesen, Lundh & Widstrom, 2005; Figueiredo & Conde, 2011; Goodman, 2004; Matthey, Barnett, Ungerer & Waters, 2000; Ramchandani et al., 2005). However, men have also been found to suffer from both pre- and postpartum depression, with prevalence rates ranging from 1% to 13% (Bradley & Slade, 2011 for a review; Fletcher, Matthey & Marley, 2006; Matthey et al., 2000). Paulson and Bazemore (2010) suggested that men's depressive symptoms peak at 3 to 6 months postpartum with rates of up to 25.6%.

Some research indicates that anxiety may be even more prevalent than depression, especially in pregnancy (Brockington, Macdonald, Wainscott, 2006; Condon, Boyce & Corkindale, 2004; Heron O'Connor, Evans, Golding & Glover, 2004; Matthey et al., 2003). Results from empirical studies show that anxiety in pregnancy could affect more than 25% of women (Lee et al., 2007; Ross & McLean, 2006) and up to 20% of men (Buist, Morse & Durkin, 2003; Condon et al., 2004). In their large UK study, Heron et al. (2004) found that 13% of women experienced postpartum anxiety symptoms. Wenzel et al. (2005) further reported postpartum prevalence rates of 8.2% for generalised anxiety disorder amongst mothers, accompanied by another 8.2% suffering from other types of less common anxiety disorders (OCD, panic disorder and social anxiety disorder), whilst rates for men have been estimated to be between 4.4% and 9.7% (Bradley, Slade & Leviston, 2008; Bradley & Slade, 2011; Matthey et al., 2003). Prevalence figures of childbirth-related PTSD are lower, ranging between 1 and 7% in women (Ayers & Pickering, 2001; for a review see Olde et al., 2006; Zambaldi, Cantillon & Sougey, 2009). Prevalence of birth-related PTSD in men is lower than in women, with one study failing to find any cases of fully symptomatic PTSD in fathers, although 12% presented with significant symptoms on at least one dimension (Bradley et al., 2008).

Studies of the course of mental health during the transition to parenthood suggest that anxiety and depression combined may be more common in pregnancy than in the postpartum period for both women (Andersson, Sundstrom-Poromaa, Wulff, Astrom & Bixo, 2006; Bretkopf et al., 2006) and men (Buist et al., 2003; Condon et al., 2004). Recent evidence showed that women's and men's rates of anxiety and depression in pregnancy were around 16%, decreasing to around 9% in the early postpartum period (Figueiredo & Conde, 2011).

It is important to be aware of the high co-morbidity and symptom overlap between depression, anxiety and PTSD (e.g., Czarnocka & Slade, 2000; Figueiredo & Conde, 2011; Parfitt & Ayers, 2009; Wenzel et al. 2005; White, Matthey, Boyd & Barnett, 2006), although evidence is sparse regarding comorbidity levels in men. Specifically, Ross, Evans, Sellers and Romach (2003) found that up to 50% of women suffering from clinical depression in the perinatal period also experienced comorbid anxiety symptoms. Matthey et al. (2003) even suggested that the term "postnatal mood disorder" which incorporates anxiety symptoms as well as depression could be more appropriate, rather than separating these diagnoses.

The prevalence rates of mental health problems during the transition to parenthood also need to be set in the context of population prevalence rates. Jenkins et al.'s (1998) epidemiological study showed for example depression rates of around 3% in a general population of UK women, which is lower than the prevalence rates amongst women in the perinatal period (e.g., Gavin et al., 2005). For fathers, population prevalence rates of mental health have been reported to be 2% (Jenkins et al., 1998), which similarly indicates that men have higher risk of developing mental health problems in the transition to fatherhood.



As shown above, the prevalence rates of mental health problems vary between studies. This could be attributable to variations in timing, differences in measurement methods, and size and nature (characteristics) of the samples, which therefore restricts comparisons between studies. For example, Paulson & Bazemore's (2010) meta-analysis of parental pre- and postpartum depression found that self-report measures produced significantly higher overall prevalence rates (11%) compared to interview based criteria (5%). It should be noted that self-report measures may be sensitive to reporter bias (e.g., Evans et al., 2012), although conversely it could be argued that anonymous self-report measures may enable some people to be more willing to admit to socially undesirable feelings compared to when questioned directly by an authority figure.

### **1.3.3 Risk factors**

A large number of pre, peri and postpartum psychiatric, psychosocial and obstetric risk factors to the development of postpartum mental health problems have been identified. The diathesis-stress model is relevant in the context of vulnerability and risk factors interacting with a stressful event such as childbirth. Vulnerability factors include genetic predispositions and neuro-behavioural vulnerabilities originating from fetal adversity (Lai & Huang, 2011; Schlotz & Phillips, 2009; Talge, Neal & Glover, 2007), previous mental health problems or traumatic experiences (e.g., Murray et al., 2003; Czarnocka & Slade, 2000), and experiences of anxiety or depression in pregnancy (Buist et al., 2003; Correia & Linhares, 2007; Lee et al., 2007; Sutter-Daley, Giaconne-Marcésche, Glatigny-Dallay, Verdoux, 2004). Other vulnerability factors include a personal family history of mood disorder (O'Hara & Swain, 1996), unplanned pregnancy (Bradley & Slade, 2011), own attachment problems (Simpson & Rholes, 2008), specific personality traits (Soet, Brack & Dilorio, 2003) or cognitive

vulnerabilities, such as dysfunctional attitudes and attributions (Bailham & Joseph, 2003).

Birth related risk factors include type of birth, obstetric complications, lack of support during birth, dissociation or psychological distress during birth and negative subjective experiences of birth (Ayers & Ford, in press; Bradley et al., 2008; Matthey et al., 2000; Rowlands & Redshaw, 2012; Ryding, Wijma & Wijma, 1997; Zaers, Waschke & Ehlert, 2008). Another correlates of postpartum mental health problems is having a partner who suffers from mental health problems (e.g., Areias, Kumar, Barros & Figueiredo, 1996; Goodman, 2004; Matthey et al., 2000; Wee, Skouteris, Pier, Richardson & Milgrom, 2011). Relationship difficulties or lack of social support, particularly from the partner (Bielawska-Batorowicz & Kossakowska-Petrycka 2006; Buist et al., 2003; Milgrom et al., 2008; Simpson et al., 2003; Wee et al., 2011) are further risk factors, also in same-sex couples (Ross, Steele & Sapiro, 2005). Socio-economic risk factors include low education and unemployment (e.g., Deater-Deckard, Pickering, Dunn & Golding, 1998). Subjective parental factors, such as negative perceptions of the baby's behaviour (Atkinson & Rickel, 1984) or a discrepancy between personal expectations and actual birth experience (Olde et al., 2006) have also been found to contribute to parental mental health problems.

#### **1.4 Mental Health and Child Developmental Outcomes**

It is therefore evident that there are a range of mental health problems that women and men may suffer from in the transition to parenthood. Poor parental mental health in pregnancy and postpartum has been identified as a major risk factor for detrimental child outcomes. Several studies suggest that anxiety or depression in pregnancy has a negative impact on the child's later outcomes, such as behavioural problems, emotional development, cognitive development and mental health (e.g.,

Correi & Linhares, 2007; Evans et al., 2012; Glover, 2011; Hollins, 2007; Punamaki et al., 2006; Van Batenburg-Eddes et al., 2009). This association also appears to be independent of the influence of postpartum mental health (e.g., Davis & Sandman, 2010; Deave, Heron, Evans & Emond, 2008; Hay, Pawlby, Waters, Perra & Sharp, 2010). Abnormal physiological pathways within biological systems (e.g., the neuroendocrine, immune/inflammatory and cardiovascular systems) have been identified as having a potential effect on fetal development (Federenko & Wadhwa, 2004; Field, Diego & Hernandez-Reif (2006), which consequently may lead to less optimal child development. Alternatively, twin and adoption studies provide evidence of potential genetic transmission of risk for adverse child outcomes (Kim-Cohen, Moffitt, Taylor, Pawlby & Caspi, 2005).

Although the majority of research regarding parental postpartum mental health problems has focused on the consequences of maternal postpartum depression on child outcomes (e.g., Murray & Cooper, 1996; Murray, 2009; Murray et al., 2011), evidence suggests postpartum anxiety is also important to consider. A review of 18 studies found evidence of adverse effects of postpartum maternal anxiety on the child's somatic (e.g., recurrent abdominal pain) and psychological outcomes (e.g. conduct problems), but with inconclusive evidence of developmental delays (Glasheen et al., 2010).

There is very little research on the effect of PTSD on child outcomes. Bosquet Enlow et al. (2011) found associations between maternal PTSD symptoms at six months postpartum and emotional regulation at 13 months, but not for emotional reactivity. Also, Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex & Ansermet (2003) reported that the severity of PTSD symptoms amongst parents of premature babies significantly predicted their child's subsequent sleeping and eating problems 18 months postpartum. Interestingly, eating problems were significantly associated with higher levels of PTSD

symptoms in fathers, but not in mothers. Similarly, depression in fathers has been found to have adverse effects on the child's behavioural (e.g., conduct problems) and emotional outcomes, even after controlling for maternal depression, with the highest risk amongst boys of fathers who suffered from depression both in pregnancy and postpartum (Ramchandani et al., 2005; Ramchandani, O'Connor, et al., 2008; Ramchandani, Stein et al., 2008).

The type and severity of psychopathology and timings of symptoms (i.e., pregnancy and/or postpartum) may thus have differential negative effects on child outcomes (e.g., Barker, Jaffee, Uher & Maughan, 2011). There are many interrelated, mediating and/or moderating risk factors, for negative child developmental outcomes, not just parental mental health. The impact of parental mental health on the child outcomes need for example to be considered within a broader family context with many interrelated factors and processes (e.g., Belsky, 1984).

### **1.5 Mental Health and the Parent-Infant Relationship**

It has been established that poor parental mental health is one of the main risk factors for an unsatisfactory parent-infant relationship, as it may interfere with the normal bonding and attachment process by decreasing parental sensitivity and responsiveness (e.g., Field, 2010 for a review), and negatively influence parental cognitions and representations of their baby (Hernandez-Martinez, Canal Sans, Fernandez-Ballart, 2011). The parent-infant relationship has also been identified as an important neuro-behavioural mediating mechanism through which parents' mental health potentially negatively influences child outcomes, such as the child's attachment organisation (Tomlinson, Cooper & Murray, 2005; Wan & Green, 2009), socio-emotional and cognitive development (e.g., Grace, Evindar & Stewart, 2003; Murray, FioriCowley, Hooper & Cooper, 1996; Westbrook & Harden, 2010) and the biological development

of the brain (Schoore, 2001). A poor quality relationship may lead to increased risks of child abuse and neglect (Barlow, 2012; Scannapieco & Connell-Carrick, 2005). One explanation of this mechanism is that the behavioural and emotional patterns which are characteristic of parents with mental health problems (e.g., reduced responsiveness), may result in less optimal interactions with the baby (Cummings & Davies, 1994). This, in turn, may reduce the infant's responsiveness (Field, 2010), attention (Steadman et al., 2007) and ability to regulate their emotions and arousal via the attachment relationship (Barlow, 2012), or may trigger severe anxiety in the infant (Murray, 2009; Tronick & Reck, 2009). All these factors potentially contribute to less optimal developmental and behavioural child outcomes.

Parents with mental health problems, especially depression, may also present with negative cognitive biases. Distorted parental representations of their infant, with negative cognitive bias (Cornish et al., 2006) may contribute to the negative impact of parental psychopathology on the parent-infant relationship and subsequent child outcomes, as these may alter the way the parent thinks and feels about, and thus interacts with, their child (Dollberg, Feldman & Keren, 2010; Hernandez-Martinez et al., 2011). Interestingly, some studies have shown that deficiencies in accuracy of perceiving and interpreting infant emotions may be a precursor to reduced parental responsiveness (Arteche et al., 2011; Broth, Goodman, Hall & Raynor, 2004; Pearson, Lightman & Evans, 2009; Pearson, Cooper, Penton-Voak, Lightman & Evans, 2010).

The impact of maternal depression on the mother-baby relationship is well documented. There is substantial evidence that women with depression are less sensitive to their infants' state (e.g., Field, 2010 for a review; Lovejoy, Graczyk, O'Hare & Newman, 2000 for a meta-analysis). This effect is found across cultures and socioeconomic groups (Field, 2010). A variety of parenting behaviours have been

identified in depressed mothers, such as withdrawn interactions with disengaged and unresponsive behaviour or conversely intrusive and interfering behaviours (Field, Hernandez-Reif & Diego, 2006; Field, 1998; Herrera, Reissland & Shepard, 2004; Murray, Fiori-Cowley, Hopper & Cooper, 1996). Lovejoy et al. (2000) found that the strength of the association between depression and parenting behaviour changed depending on the type of observed behaviour, with the strongest effect between negative intrusive behaviours and depression. However, Tharner et al.'s (2012) study found that neither maternal pre or postnatal depression nor a life time history of depression were associated with an increased risk of insecure or disorganised attachment in the infant. They propose that there are a number of moderating and mediating factors involved, such as social support, severity and chronicity of depression as well as the maternal own attachment representations that potentially protect or alternatively heighten the risk for infant attachment difficulties. Their research importantly suggests that poor maternal mental health is not necessarily disrupting the mother-infant relationship.

Maternal depression can also indirectly negatively influence their partner's interactions with the baby (Goodman, 2005b) and vice versa (Bradley & Slade, 2011). Alternatively, non-depressed fathers may buffer negative effects from a depressed mother by providing high quality father-infant interactions with optimal stimulation and arousal modulation (Edhborg, Lundh, Seymyr & Widstrom, 2003; Field, 1998).

The negative effect of paternal depression on fathers' parenting behaviour has been highlighted in recent years, with depressed fathers showing similar patterns of behaviours to that of mothers, with decreased positive and increased negative parenting behaviours (see Wilson & Durbin, 2010 for a meta-analysis) and less optimal bonding (Edhborg et al., 2005). Recently, Ramchandani et al. (2013) found evidence that remote and disengaged father-infant interactions at three months postpartum predicted child

externalising problems at one year of age, and fathers' positive involvement has been shown to reduce cognitive delays in their children, especially sons (Bronte-Tinkew, Carrano, Horowitz & Kinukawa, 2008). It is therefore essential to view the child from a family systems perspective and consider both parents' contributions to the quality of family relationships and child outcomes.

In addition to depression, postpartum anxiety may have a negative impact on the parent-infant relationship. For example, McMahon, Barnett, Kowalenko, Tennant and Don (2001) found that postpartum maternal anxiety was associated with infant difficulty at four months postpartum, whilst Davis et al. (2004) found no postnatal effects of anxiety symptoms on infant negative behaviour, only prenatal effects. Mammen, Pilkonis & Kolko (2000) also showed that both anxiety and depression were associated with parental anger, which may be an additional mechanism through which parental mental health is linked to an impaired parent-infant relationship.

Evidence regarding the links between PTSD and impaired parenting is still inconclusive. Significant associations between postnatal PTSD and the parent-baby relationship have been found in some studies (Muzik, 2013; Parfitt & Ayers, 2009). Parfitt and Ayers's (2009) study suggested that PTSD was more strongly associated with bonding impairment than depression. Muzik et al.'s (2013) more recent study which also included previous trauma, childhood abuse and neglect as well as psychopathology (PTSD and depression) indicated that psychopathology conveyed the greatest risk for bonding impairment, with significant separate main effects of PTSD and depression on bonding impairment during the first six months postpartum. However, McDonald, Slade, Spiby and Iles (2011) did not find any links between maternal posttraumatic stress symptoms and maternal perceptions of their children or

parenting stress either at 3 months or 2 years postpartum, once depression was accounted for.

The timing of the onset of mental health problems, comorbidity and presence of protective factors (e.g., secure parental attachment style) may all play a role in explaining differential effects of parental mental health on the parent-infant relationship and subsequent child outcomes. For example, Flykt et al. (2010) found that maternal depressive symptoms in pregnancy were more strongly related to unresponsiveness than were postpartum symptoms. Furthermore, an autonomous attachment style in the mother protected the mother-baby interaction from negative effects of postnatal depressive symptoms.

Even though it may be the parent who initiates negative interactive patterns with their baby, Crittenden (1985; 1992) asserted that it is important to also view the parent-infant interaction from the child's perspective, as the infant actively contributes to the relationship in transactional bi-directional interactions with their parent. The infant may respond differently depending on the interactive style of the parent. For example, the infant may use avoidance behaviours in interaction with an intrusive mother, or distress and protest with a withdrawn mother (Field, Healy, Goldstein & Guthertz, 1990). Conversely, the *infant's temperament and characteristics* may also affect the parent's mental health and quality of the parent-infant relationship. For example, Zhu et al. (2007) found that characteristics such as intensity of response and automatic stability in three-day-old babies were predictive of the quality of mother-infant interaction at one month postpartum. Similarly, Murray, Stanley, Hooper, King and FioriCowley (1996) found that an infant's poor motor functioning and high irritability predicted the quality of maternal interaction and the onset of maternal depression eight weeks later. Other studies have similarly shown that the associations between difficult infant temperament



and parental mental health problems emerge in the early postpartum period (Bang, 2011; Britton, 2011), especially in low income families (Melchior et al., 2011). Recent findings also indicate that early infant temperament may act as a moderator of the relationship between parental depression and child behavioural problems (e.g., Dale et al., 2011) and that early parental perceptions of their baby may predict later child mental and psychomotor developmental outcomes (Hernandez-Martinez, Canals Sans & Fernandez-Ballart, 2011). However, the underlying mechanisms and direction of effect of this association are hard to establish. In a prospective study, Hanington, Ramchandani and Stein (2010) found evidence of “parent to child effects” rather than “child to parent effects” as both maternal and paternal depressive symptoms at six months postpartum predicted a more difficult temperament when the baby was 24 months. Similarly, Pesonen et al. (2008) highlighted the transactional nature of temperament development and found that the effect of maternal stress on the child’s temperament over five years was greater than the child to parent effect. Also, studies have suggested that maternal distress in pregnancy may raise antenatal cortisol levels which then negatively affect the infant’s early behaviour and temperament (e.g., Davis et al., 2007). Alternative explanations include that parents who suffer from mental health problems are more likely to report negative perceptions of their infant, poorer relationship with the infant and worse infant adjustment (Britton, 2011; Forman et al., 2007, Kemppinen et al., 2007).

It should be noted that although poor parental mental health is a major risk factor for parent-infant bonding disorders, only a proportion of women with postpartum mental health problems (10-25%) suffer from bonding difficulties (Bernazzani et al., 2005; Brockington, Aucamp & Fraser, 2006) and bonding difficulties may also occur in parents without mental health problems, with prevalence rates of three to 9% in the

general population (Righetti-Veltema, Conne-Perrard, Bousquet & Manzano, 2002; Skovgaard, Houmann, et al., 2007). It has therefore been argued that bonding or parent-infant relationship disorders should be more widely recognised as distinct disorders and included in future classification systems. Some researchers have proposed that bonding disorders should be separated from other mental health diagnoses, as they don't necessarily co-exist and may need different treatment approaches (Brockington Aucamp & Fraser, 2006; Condon, 2010; Forman et al., 2007). Possible treatments include baby massage (Onozawa, Glover, Adams, Modi & Kumar, 2001), play therapy or parent-infant psychotherapy, such as the "watch, wait and wonder" programme (Muir, 1999) or video based interventions (Vik & Hafting, 2006). In contrast, psychopathology may require interventions such as cognitive behavioural therapy and/or pharmacological interventions (Ammerman et al., 2007; Gregoire, Kumar, Everett, Henderson & Studd, 1996). This is especially important given the research that suggests it is primarily the decreased quality in the parent-infant relationship, rather than parental mental health, which affects children's outcomes (Murray, Hipwell et al., 1996; Murray & Cooper, 1996; Murray, Fiori-Cowley, et al., 1996). Apart from parental mental health, there are a range of other possible contributing risk factors to a less optimal parent-infant relationship, such as lack of social support (Cutrona & Troutman, 1986), parental attachment patterns (Mantymaa, Puura, Luoma, Salmelin & Tamminen, 2006), parental childhood abuse (Dilillo, Tremblay & Peterson, 2000) and "spillover" between the couple's relationship and the parent-baby relationship as described below.

## **1.6 Mental Health and the Couple's Relationship**

The transition to parenthood involves major adjustments and changes, both positive and negative, for the couple's relationship. Many couples report a reduction in their relationship quality in the weeks and months after child birth (Bateman & Bharj,

2009; Cowan & Cowan, 1988 & 2002; Levy-Shiff, 1994). Relationship discord can be one of the main contributing risk factors for the development of perinatal mental health problems (Milgrom et al., 2008; Simpson et al., 2003). Relationship difficulties within the couple may also be a consequence of one or both of the parents suffering from poor mental health. For example, Milgrom and McCloud (1996) showed that postnatal depression in the mother had a negative effect on both partners' ratings of their marital relationship. Similarly, Zelkowitz and Milet (1996) found that partners of depressed women perceived less intimacy in their relationship compared to men with unaffected partners. More recently, Lilja, Edhborg and Nissen (2011) found that mothers' early depressed mood predicted a less optimal partner relationship during the first year of parenthood. For fathers (Ramchandani et al., 2011), depression has also been associated with a heightened risk of partner relationship difficulties, even after controlling for maternal depression.

In addition to postnatal depression, relationship distress may be a consequence of postpartum anxiety (Wenzel et al., 2005), and a few studies have found associations between PTSD symptoms and the quality of the couple's relationship (Parfitt & Ayers, 2009; Nicholls & Ayers, 2007). Specifically, Iles, Slade and Spiby (2011) found that symptoms of postpartum depression and PTSD were associated with perceptions of less secure partner attachment and partner support amongst both men and women. Furthermore, postnatal PTSD has been shown to have a negative effect on the couple's sexual relationship (Fones, 1996). However, these are qualitative or cross sectional studies where it is impossible to determine the direction of effect, i.e. whether low quality of the couple's relationship is the cause or consequence for mental health problems.

Both direct and indirect links between the quality of the couple's relationship and child cognitive, emotional and behavioural outcomes have been established (Cummings, Keller & Davies, 2005; Hanington, Heron, Stein & Ramchandani, 2012). For example, problems in the couple relationship may "spill over" onto the parent-child relationship, with negative parent-infant interaction patterns (Erel & Burman, 1995; Krishnakumar & Buehler, 2000; Mantymaa, Puura, et al., 2006; Owen & Cox, 1997), which in turn may have a negative effect on child outcomes. These studies have been guided by the family systems perspective, viewing the family as a whole with a number of interrelated family influences.

Several studies (Cummings et al. 2005; Hanington et al., 2012; Weinfield, Ingerski & Moreau, 2009) also suggest that the couple's relationship quality mediates the association between parental depression (both maternal and paternal) and adverse child outcomes. Hanington's findings from the Avon Longitudinal Study, a large cohort study of parents and children, additionally showed that marital conflict in pregnancy had a negative impact on child outcomes at 42 months postpartum. One explanation for this finding is that marital conflict in pregnancy is an intrapersonal stressor that exposes the unborn baby to higher levels of stress hormones with potential long-lasting detrimental effects.

## **1.7 Summary, Rationale and Aims**

In summary, there is theoretical and empirical evidence that women and men's mental health, the parent-infant relationship, the couple's relationship and the child's temperament and outcomes are closely interrelated and affect each other dynamically across time during the transition to parenthood. Belsky's process model of parenting includes several of these factors so is a useful framework to inform work within the current thesis, whilst also incorporating views from other theoretical frameworks, such

as the diathesis-stress model, family systems' theory, attachment theory and transactional models.

Empirical research regarding the transition to parenthood period indicates that both women and men are at higher risk for developing mental health problems such as depression, anxiety and PTSD during this time, although women are more vulnerable than men. This implies that clinical intervention and research should include both partners. Recently, research has shown that anxiety may be as common as depression in the transition to parenthood, and possibly even more common than depression in pregnancy. In addition, co-morbidity between disorders is high. This highlights the need to routinely consider anxiety and PTSD, as well as depression. The pregnancy period appears to be a particularly vulnerable time for the development of mental health problems, especially anxiety. Therefore, interventions and research should target both the pregnancy and postpartum period.

There are a range of interrelated causes and consequences of parental mental health problems. A major concern is the negative consequences that poor parental mental health may have on the child's developmental outcomes. Much of the current research has focused on the effects of depression on these outcomes. Therefore it is important for researchers to also consider the effects of other parental mental health problems, such as anxiety and PTSD, on child development.

Parental mental health problems, both in pregnancy and postpartum have also been shown to negatively influence the parent-infant relationship. The importance of a satisfactory parent-infant relationship for optimising child outcomes is acknowledged and its potential as a mediating factor recognised. However, to date, most research has focused on the association between maternal postnatal depression and the parent-infant

relationship, whilst less is known about the links with anxiety and PTSD, particularly for the father-infant relationship.

The infant's temperament is another potential correlate of parental mental health, parenting and child behavioural problems. However, few studies have included parental reports of infant temperament as a predictor of child developmental outcomes in the context of parental mental health. Research also suggests that the couple's relationship is closely associated with the parent-infant relationship and that there are bi-directional effects between the couple's relationship quality and parental mental health. Both direct and indirect links with child outcomes have been found. Partners within the same family appear to affect each other's' mental health and family interactive patterns, either in buffering or deleterious ways. This highlights the importance of including both partners in transition to parenthood studies and interventions.

Finally, it is important to be aware of the wide variation in methodology used in studies within the field of mental health, family relationships and child outcomes, regarding the type and timing of measurements and sample characteristics. This may influence the findings and make comparisons between studies and generalisations difficult. For example, many studies of parent and child outcomes are based on questionnaire measures completed at one time point in the early postpartum period. Future studies would thus benefit from also incorporating other methods, such as interviews and observations, within the same sample, and follow families across time points. A mixed method approach using both qualitative and quantitative methods has therefore been utilised within the current thesis.

This research review indicates that there are a number of gaps in the current literature with limited research including both mothers and fathers from the same families. Longitudinal and prospective studies that explore pre and postnatal mental health disorders other than depression, such as PTSD and anxiety, and their associations with family relationship variables and child development in both partners are rare.

The overall objectives of this thesis were therefore to:

- (i) Gain a detailed description of men and women's transition to parenthood in terms of their mental health and family relationships
- (ii) Prospectively examine parents' transition to parenthood in terms of how their pre- and post-partum mental health, the couple relationship, parent-infant interaction, and their child's development inter-relate.

The specific aims were to:

1. Examine parents' verbatim subjective experiences of their relationship with their baby, and to explore any differences in those accounts amongst parents experiencing postpartum mental health problems or parental anger (Article 1).
2. Describe both parents' transition to parenthood with regards to their mental health and family relationships in detail and to explore any differences in this transition in the context of parental gender and postpartum mental health (Article 2).
3. To explore the associations between and effect of parental mental health (PTSD, depression and anxiety), the couple's relationship quality, and the infant's temperament on the parent-baby bond concurrently and across time (Article 3).
4. Examine the impact of fathers' and mothers' pre- and post-partum mental health on mother-infant and father-infant interactions (Article 4).

5. Investigate the associations between parental mental health, parent-infant relationship, infant characteristics, the couple's relationship and child developmental outcomes (Article 5).

The above aims were addressed through the Sussex Journey to Parenthood Study (JTP), a prospective in-depth study of couples having their first baby recruited in late pregnancy and followed up to 17 months postpartum. Within this study, a series of investigations focused on specific aspects of parental mental health, family relationships and child developmental outcomes. The range of qualitative and quantitative measures taken at different time points is shown in Figure 1.2. Ethical approval was granted by the NHS Research Ethics Committee (Appendices C, D and E) and BPS ethical guidelines (2004) were followed.

The specific procedures, measures and statistical methods applicable to each part of the study are described in each chapter. Table 1.1 shows an overview of time points, analysis, participant numbers and measures used in the five articles.



**Table 1.1 An overview of time points, analysis, participant numbers and measures in the five articles**

	Time 1: Pregnancy	Time 2: 3 – 5 months postpartum	Time 3: 15 – 17 months postpartum
<b>Article 1:</b> <i>Postnatal mental health and parenting: The importance of parental anger</i> Cross sectional interview study. Thematic analysis of verbatim accounts Quantitative analysis of frequencies of themes (Chi square and effect sizes)		Birmingham Interview of Maternal Mental Health (BIMMH) <i>N</i> = 85 (40 couples with both partners and 5 additional women)	
<b>Article 2:</b> <i>The transition to parenthood and mental health in first time parents</i> Quantitative analysis of transition to parenthood interview variables (e.g. Correlations, Chi square Logistic regression)		Birmingham Interview of Maternal Mental Health (BIMMH) <i>N</i> = 86 (40 couples and 6 additional women)	
<b>Article 3:</b> <i>Factors associated with the parent-baby bond in men and women: a prospective study</i> Prospective questionnaire study (Correlations, repeated ANOVA's, Multiple regression) <i>N</i> = 141 (75 women & 66 men)	Self-report Questionnaires: Demographic data (Time 1) Depression & Anxiety (HADS) Couple's relationship (DAS) <i>n</i> = 125 (68 women & 57 men)	Self-report Questionnaires: Depression & Anxiety (HADS) Post-traumatic Stress (PDS) Parent-baby bond (PBQ) Infant Characteristics (ICQ) <i>n</i> = 107 (58 women & 49 men)	Self-report Questionnaires: Depression & Anxiety (HADS) Post-traumatic Stress (PDS) Parent-baby Bond (PBQ) Infant Characteristics (ICQ) Couple's Relationship (DAS) <i>n</i> = 99 (56 women & 43 men)
<b>Article 4:</b> <i>The impact of parents' mental health on parent-baby interaction: a prospective study</i> Prospective observational study (Correlations, Paired <i>t</i> -tests, Multiple regression)	Self-report questionnaires: Depression & Anxiety (HADS) Post-traumatic Stress (PDS)	Observations: Videotaped mother-infant and father-infant interactions according to CARE index procedure <i>N</i> = 84 (44 women & 40 men, from 45 couples)	
<b>Article 5:</b> <i>Infant developmental outcomes and parental mental health: a family systems perspective</i> Longitudinal study using observations, infant developmental assessment & interviews (Principal component analysis, Correlations, Multiple regression)		Observations : CARE-index (as above) Birmingham Interview of Maternal Mental Health (BIMMH)	Bayley Scales of Infant Development III <i>N</i> = 42 children and their parents

## 2 Postnatal Mental Health and Parenting: The Importance of Parental Anger (Article 1)

Parfitt, Y. & Ayers, S. (2012). Postnatal mental health and parenting: The importance of parental anger. *Infant Mental Health Journal*, 33 (4), 400 – 410.

### 2.1 Abstract

**Background:** Parents' postnatal mental health and subjective perceptions of their baby are likely to influence the quality of their relationship with their baby. To date this has largely been examined in mothers. This study therefore aimed to also explore this in both parents.

**Methods:** Semi-structured clinical interviews (Birmingham Interview for Maternal Mental Health, BIMMH) were carried out with 85 first-time parents. The BIMMH identifies disorders of anxiety, depression, PTSD and parental anger. Sections of the BIMMH also elicit qualitative accounts of parenthood. These were transcribed and analysed using thematic analysis. Differences in the frequency of themes were examined for parents with or without mental health disorders or parental anger.

**Results:** Themes are reported for (1) Baby characteristics, needs and development (2) Parents' emotions, responses, coping strategies and general parenthood (3) Parent and baby relationship. Results indicated that both the presence of parental mental health problems and more notably parental anger were associated with more negative accounts of the self, the baby and parenthood.

**Conclusions:** This study provides insight into first-time parents' perceptions of early parenthood. Results especially highlight the need to consider parental experiences of anger in more detail for assessment and interventions in the early postpartum period.

## 2.2 Introduction

The birth of a child can be a challenging experience for first time parents and is accompanied by both physical and emotional demands. The importance of forming a satisfactory and intimate early relationship between the mother and her baby has been acknowledged for several decades (e.g., Bowlby, 1969). Research shows that the quality of the early parent baby relationship can have lasting effects on a child's development, including socio-emotional adaptation (Hay & Pawlby, 2003), cognitive development (Murray et.al., 1996), language development (Trevvarthen & Aitken, 2001), functional and biological development of the brain (Schore, 2001), child psychopathology (Skovgaard et al., 2008), and the child's attachment status (e.g. Tomlinson, Cooper & Murray, 2005). Unwanted pregnancy and poor pre-partum bonding have also been shown to have a negative effect on the parent baby relationship (e.g., Brockington, Aucamp & Fraser, 2006; Siddiqui & Hagglof, 2000).

Models of parenting (e.g. Belsky, 1984) state that there are many factors that affect the parent baby relationship, including parental factors, characteristics of the baby and contextual factors. Important parental factors include sensitivity to the infant's state, mental representations of the baby, and mental health, all of which have been shown to influence the parent baby relationship. For example, women's representations of their babies during pregnancy have been associated with the infant's attachment classification at 18 months (Benoit, Parker & Zeanah, 1997). A recent qualitative study using both interviews and observations (Dollberg, Feldman & Keren, 2010) found significant associations between the quality of maternal representations and relational behaviour in mother-child dyads from an infant mental health clinic and the community. Mothers attending the infant mental health clinic had narratives that were less joyful, less coherent and more hostile, and their relational behaviours showed lower sensitivity,

higher intrusiveness and less supportiveness of their child compared to community dyads.

Maternal sensitivity has also been recognised as a key factor in the quality of the mother-baby relationship and attachment security (de Wolff & van Ijzendoorn, 1997). Fonagy, Gergely, Jurist and Target (2002) argue that this sensitivity is particularly related to parental attachment patterns, where the parents' own adverse experiences during their childhood may lead to distorted representations of their baby, with a reduced ability to view the baby as an intentional being. This is often referred to as mind-mindedness and there is some evidence that it has a stronger association with the child's subsequent attachment status, theory of mind and language development (Meins et al., 2003) than factors such as social support and postnatal depression.

Parental psychopathology may affect parents' perceptions, sensitivity and ability to interpret and respond to their baby's signals. Brockington (2004) reported that between 10% and 25% of mothers with postpartum psychiatric disorders also presented with an impaired relationship with their baby. Another study showed that 29% of mothers in a clinical sample had various degrees of pathological anger, with severe anger in 8 % (Brockington, Aucamp & Fraser, 2006). There is evidence that postnatal depression in particular is associated with deficiencies in the parent baby relationship, such as impaired communication with less synchrony, reciprocity and decreased emotional involvement and responsiveness from the mother (Murray, Fiori-Cowley, Hooper & Cooper, 1996) and also less smiling and corporal interactions (Righetti-Veltema, Conne-Perrard, Bousquet & Manzano, 2002). Anxiety is also likely to influence the parent baby relationship. A recent review concluded there are strong adverse effects of postnatal maternal anxiety on children with evidence of disrupted attachment, somatic problems (e.g. colic) and behavioural and emotional problems

(Glasheen, Richardson & Fabio, 2010). Traumatic experiences at birth can also influence the parent-baby relationship. For example, both quantitative (Parfitt & Ayers, 2009) and qualitative studies (Ayers, Eagle & Waring, 2006, Ballard, Stanley Brockington & Stanley, 1995; Nicholls & Ayers, 2007) show evidence of disturbed parent baby relationship in parents suffering from PTSD following childbirth.

To date, it is not clear what mechanisms underlie the effect of parental psychopathology on the parent-baby relationship but one possible factor is hostility (e.g. Wisner, Peindl, Gigliotti & Hanusa, 1999). Pregnant and postpartum women are more likely to develop anger problems due to sleep deprivation, marital discord, stress and fatigue (Cummings & Davies, 1994). Anger has also been shown to be associated with depression and anxiety and to mediate the effects of depression and anxiety on parent to child aggression (Mammen, Pilkonis & Kolko, 2000). Brockington, Fraser and Wilson (2006) emphasise the importance of distinguishing between aggressive impulses in the context of anger (pathological anger) and obsessions of child harm or infanticide, which are a different phenomena.

Currently, the majority of research on the impact of postnatal psychopathology has examined the mother baby relationship, although bonding and attachment difficulties can also exist between the father and baby (e.g., Edhborg, Matthiesen, Lundh & Widstrom, 2005). Recent meta-analyses of parenting behaviours in fathers (Wilson & Durbin, 2010) and mothers (Lovejoy, Graczyk, O'Hare & Neuman, 2000) found associations between parental depression and the presence of negative parent behaviours, such as negative affect, hostile or coercive behaviour.

The parent-baby relationship is a reciprocal process where the baby also plays an active part (Sameroff, McDonough & Rosenblum, 2004). For example, early infant characteristics such as the intensity of response to stimulation (Zhu et al., 2007),

sleeping disturbances and excessive crying (Hofacker & Papousek, 1998) have been associated with a poorer mother-baby relationship. However, many studies assessing infant characteristics and temperament rely on parents' subjective perceptions of their baby. For example, a study found that depressed mothers reported more excessive crying irrespective of the child's characteristics (Milgrom, Westley & McCloud, 1995). This indicates that these reports may be more related to negative attributions and internal perceptions of the mother rather than infant behaviour.

Finally, contextual sources, particularly family relationships and social support, may affect the parent baby relationship. Family systems perspectives (e.g., Erel & Burman, 1995, Cowan & Cowan, 2002; Fivaz- Depeursinge, Favez, Lavanchy, De Noni & Frascarolo, 2005; Bell et al., 2007) acknowledge that fathers play a vital role in parenting with dyadic and triadic interaction with their baby and partner. For example, the quality of the couple's relationship itself may influence the way each partner interacts with the baby (e.g., Barnett, Deng, Mills-Koonce, Willoughby & Cox, 2008; Cummings & Davies, 1994; Erel & Burman, 1995; McHale, Kuersten-Hogan, Rao, 2004; Owen & Cox, 1997; Krishnakumar & Buehler, 2000), with a high marital quality being linked to sensitive parenting behaviours and vice versa. Marital conflict may affect the mother's and father's interaction with their baby in different ways, with fathers being less affectionate and sensitive (Owen & Cox, 1997) whilst mothers may compensate for a dysfunctional marital relationship by getting more involved (Braungart-Rieker, Courtney & Garwood, 1999). On the contrary, positive effects of the father's involvement in childcare activities have been found, with a higher sensitivity amongst mothers being associated with a greater number of activities performed by the father (Feldman, 2000). More recent evidence also suggests that there is an interdependence of parenting between mothers and fathers, with contagion of negative,

intrusive parenting across the parent-baby dyads (Barnett et al., 2008) and similarly contagion of positive, sensitive parenting across the mother-child and father-child dyads (Ryan, Martin, & Brooks-Gunn, 2006).

In summary, evidence shows that the early parent-baby relationship is influenced by a number of interacting parental, baby and relationship factors with psychopathology being a main contributing risk factor for parent-baby relationship problems. However, the mechanisms of this are not clear. Distorted negative internal representations of the baby and parental anger are all possible contributing mechanisms. The present study therefore aimed to examine mothers' and fathers' subjective accounts of their baby, themselves as parents, and their relationship with their baby and whether this differs for those with postnatal mental health problems. This was done using semi-structured clinical interviews to identify postnatal mental health disorders (including parental anger) and obtaining detailed narratives of men and women's experiences of parenting, their representations of their baby, and their perceptions of their relationship with the baby.

## **2.3 Method**

### **2.3.1 Design**

This was a study of men and women's qualitative experiences of their baby and parenting 5.4 months ( $SD = 1.05$ ) after birth and whether this experience differed between parents with common mental health problems (anxiety, depression or PTSD;  $n = 17$ ) or parental anger ( $n = 23$ ) and those without. Semi-structured clinical interviews were used to measure parental mental health, anger issues, and experiences of parenting.

### 2.3.2 Participants

Participants were a subsample recruited from The Sussex Journey to Parenthood Study (UK), a longitudinal study of the transition to parenthood from pregnancy to the postpartum. Inclusion criteria for the original study were that couples were expecting their first baby, were cohabiting, fluent in English, and over 18 years old. Three months after birth 48 families were eligible, of which 40 couples and another 5 mothers agreed to take part. The majority of the participants (82%) were Caucasian and 75 % had undergone higher education (diploma and beyond). At the time of the interview, the babies were between 4 and 8 months old ( $M = 5.41$  months,  $SD = 1.05$ ). The length of the couple's relationship ranged from 12 to 308 months ( $M = 75.21$  months,  $SD = 54.48$ ). Women ( $n = 45$ ) were aged between 18 and 46 years ( $M = 32.63$  years,  $SD = 5.70$ ) and men ( $n = 40$ ) were aged between 26 and 44 years ( $M = 33.58$ ,  $SD = 7.33$ ). Out of the 45 babies, nineteen (42%) were delivered by unassisted vaginal delivery; ten (22%) were delivered by assisted vaginal delivery, whilst five (11%) were delivered by elective caesarean section and ten (22%) by emergency caesarean section.

### 2.3.3 Measures

Mental health and qualitative experiences of parenting were measured using the Birmingham Interview of Maternal Mental Health (BIMMH; 5<sup>th</sup> edition, Brockington, Chandra, et al., 2006). This is a semi structured clinical interview that covers pre and postnatal mental health disorders, as well as the social and psychological experiences of pregnancy, birth and becoming a parent. It consists of 120 compulsory probes and 175 ratings, divided into 8 sections and takes an average of 1 hour 45 minutes to complete. The interview has been used to validate and calibrate the Postpartum Bonding Questionnaire (Brockington, Oates, George & Turner, 2001). Postnatal mental health disorders measured were anxiety, depression (none, mild, moderate and severe; rated 0-



3), PTSD (none, some evidence and severe; rated 0-2), and parent's angry responses towards the baby (none, mild, strong, difficulty keeping control, loss of control resulting in angry verbal outbursts, and loss of control resulting in physical abuse; rated 0-5). A cut off of 2 or more was used to indicate mental health disorder (moderate or severe anxiety/depression; severe PTSD; strong angry response with verbal or physical loss of control). The sample was grouped on the basis of this into (i) Parental anger/no anger and (ii) other postnatal mental health disorder/no disorder.

The section of the BIMMH that examines the parent-baby relationship (section 7) was used for qualitative thematic analysis. This section has 17 compulsory probes with questions that ask about the baby's characteristics and development as well as the parents' feelings for and responses to their baby. This includes questions such as: "Please tell me what your baby is like", "How did your feelings for your baby develop after delivery?" and "How do you feel when your baby cries or wakes you at night?"

#### **2.3.4 Procedure**

Ethical approval was obtained from the NHS Local Research Ethics Committee (Appendix C) and the University Research Governance Committee. Participants in the original longitudinal study who took part in the final postpartum follow-up at three months were sent a letter and information sheet describing this interview study. Participants were offered an incentive to take part in the interview (baby shop vouchers). Those who agreed to take part were contacted by phone or email to arrange an interview date. Interviews were done by an experienced healthcare practitioner in participants' homes and conducted separately with the male and female partner. Written informed consent was obtained before the start of the interview and confidentiality, anonymity and the right to withdraw at any time was assured. After the interview participants were debriefed. Interviews were audio recorded. The section of the

interview on qualitative experiences of parenting was transcribed verbatim and transcriptions checked against the tape.

### **2.3.5 Analysis**

Qualitative analysis was carried out using NVivo 8 software (Bazeley, 2007). Initially, 10 interview transcripts were read repeatedly and initial codes extracted. Codes were then examined for frequency and common themes to create a final coding schedule, according to inductive thematic analysis (Boyatzis, 1998). Themes and coding schedule were discussed by the authors to ensure they were representative of parents' experiences. Once the coding schedule (Appendix A) was agreed between the authors, all transcripts were then analysed and coded using this coding schedule. Additionally an independent researcher coded approximately 10% of transcripts and quotes. The inter-rater reliability was high (percentage agreement = 94%). Quantitative analysis was carried out using chi-square to examine differences in the frequency of themes reported by parents with and without mental health disorders or parental anger. Effect sizes were calculated using Phi ( $\phi$ ).

## **2.4 Results**

This section first reports the prevalence of mental health disorders and parental anger in the sample; then qualitative experiences of parents are reported together with quantitative differences between parents with and without mental health disorders or parental anger so that differences can be illustrated with qualitative information.

### **2.4.1 Postnatal mental health in men and women**

Table 2.1 shows the proportion of men and women with mental health disorder or parental anger. In the total sample, 23 participants (27 %) (13 men and 10 women) reported strong levels of anger towards their infant. Seventeen participants (20%) had

moderate or severe mental health problems. There was little concordance within couples in mental health issues, but in four couples both partners reported anger.

**Table 2.1 Postnatal mental health and parental anger in men and women**

	Total Sample	Women	Men
	n = 85	n = 45	n = 40
Mental health and Anger	<i>No. (%)</i>	<i>No. (%)</i>	<i>No. (%)</i>
Anxiety <sup>a</sup>	12 (12.9)	9 (20)	3 (7.5)
Depression <sup>a</sup>	8 (9.4)	5 (11.1)	3 (7.5)
Posttraumatic stress <sup>a</sup>	4 (4.7)	2 (4.4)	2 (5.0)
Total mental health disorders	17 (20.0)	11 (24.4)	6 (15.0)
Anger <sup>a</sup>	23 (27.1)	10 (22.2)	13 (32.5)

<sup>a</sup> Participants rating  $\geq 2$  (moderate or severe) on the Birmingham Interview for these variables have been identified in this category.

#### **2.4.2 Thematic analysis and differences between parents with and without mental health problems or parental anger**

Thematic analysis yielded information about (i) the baby, (ii) parents and (iii) the parent-baby relationship. Themes and sub themes for each of these sections are shown in Table 2.2 along with whether the frequency of these themes differed between parents with and without mental health problems or parental anger. Analyses found very few significant differences between men and women in the frequency of themes. Information for men and women is therefore not given in Table 2.3 but differences that occurred are mentioned below where themes are given in more detail and illustrated with quotations. Participants are listed by a couple identifier (a letter and a number) and whether it is the mother or father speaking. Pseudonyms have been used throughout.

#### 2.4.2.1 *Baby*

***Baby characteristics.*** Almost all parents described their baby using *positive characteristics*. “She’s lovely. She’s very happy, very smiley, very bubbly. She loves music. She’s just, she’s just a lot of fun to be with really” (F12 mother). Parents experiencing anger towards their baby used more *negative character references* compared to parents who did not experience anger. “Well first of all I thought he was a bit of a mong. As in, he seemed a bit too passive for a baby as far as I was concerned. He seemed to me a little bit, I don’t know, I was wondering about his mental state” (F10 father).

Referrals to *social characteristics* of the baby were common, especially among the mothers. “She is very smiley and engaged, you know she really engages with people” (F16 mother). Many parents referred to characteristics, both physical and temperamental, that *resembled themselves or their partner*. “The baby is just like me, it is like a version of me. She’s got lots like, she has got my chin, the eyebrows, she looks a lot like me, so I kind of like that” (Y44 father).

***Behaviours and needs.*** *Crying* was mentioned by more than two thirds of the parents and was the most frequently mentioned behaviour. Excessive crying in the early months was specifically referred to as delaying positive feelings for the baby and evoking feelings of distress in parents. “But the love thing grew as she stopped crying. She cried lots and lots when she was first born. She never seemed to stop for about two months, she cried, everywhere she just cried, and that was quite distressing” (P5 mother).

Parents with high levels of anger commented more frequently on their baby’s difficulty *sleeping*. “It is the bloody sleep. He is crying all night” (P9 mother). Significantly more mothers than fathers mentioned *feeding* behaviours. The success or

failure of breast-feeding appeared to be of great importance to mothers. “Thanks to breast feeding yeah, that’s always the ultimate answer I’m afraid to say, well I’m not afraid to say, it seems to be that it’s almost like a reset button with him it just calms him down” (A2 mother).

**Development.** Almost all parents primarily referred to their babies’ *motor development*, such as rolling, sitting, crawling, standing or grabbing things. “Well, he sits down, he loves standing so obviously you need to help him but he loves being on his two feet” (A2 father). Nearly all parents commented on their baby’s *social development*, viewing the baby’s smile as a pivotal event, a turning point, when the baby started to give something back in the interaction. “It was when he started smiling at me and when he started laughing and he became a little person at that point, whereas before he was pretty much an eating, crying, pooping machine” (F4 father).

#### 2.4.2.2 Parent

**Emotions.** Parents made frequent references to strong emotional states in the early months after the birth of their baby. Eleven sub-themes consisting of mainly negative but some positive emotions (e.g. pride and joy) were identified (see Table 2.3). Negative emotions such as *anger*, *disappointment* and *guilt* were significantly more prevalent in those with parental anger. “Angry when I’ve given her lots of care and she keeps fidgeting and not happy with me; and yet as soon as she’s in her mother’s arms, she’s completely happy. Bit angry about that, I am angry about that, yeah” (F44 father). “I was disappointed in myself the way that I was coping, in those early days...I just felt so guilty that I was that angry with him and it wasn’t his fault” (F4 father).

Parents suffering from postnatal mental health problems also reported feelings of anxiety, guilt and depression more frequently: “I was a bit scared to be on my own with her. I still don’t like bathing her, I still worry that I’ll drown her in the bath and I

still get quite anxious so if I bath her on my own, it's very quick, no fun, no play" (F13 mother). "I would dread him like, you know, it was absolute fear of going to bed. Fear of the night, fear of his crying, fear of not knowing what to do, so much fear and anxiety" (P9 mother).

Statistically significantly more men commented on *feelings of frustration*, whilst significantly more women experienced positive feelings of *calm and control*. "A little frustrated. It's difficult, if there didn't seem to be anything wrong with him, it was more frustrating" (F40 father). "It's made me a lot calmer. I don't know whether that's because I don't have to worry about work, but I don't get stressed about a lot of things anymore" (F30 mother).

***Impulse and control.*** More than half of all parents mentioned acute *impulsive thoughts*. Significantly more people in the anger group commented on impulses to harm their baby as a response to their baby's cries or being woken up at night. This response was also more frequent amongst parents with postnatal mental health issues. "I've just wanted to throw him, at a wall, out the window. That would be the worst thing that I've felt" (F63 mother). "I could kill. Like that you could kill. It was really that acute. It was quite murderous, and then the guilt that follows that is just humongous" (Y27 mother). Also, reports of actual loss of control and aggressive behaviours, such as shouting at or rough handling of their baby were significantly more frequent amongst parents in the anger group. "Because I was feeling really very stressed and I involuntarily hurt her, because I was probably grabbing her very, very tight and probably I hurt her ear" (Y44 father).

***Coping Strategies.*** It seemed that the *support from their partner*, both practical and emotional and sharing the responsibilities, was seen as crucial in coping with the baby in the early days. "We know when one of us is really tired, the other one just

knows when to, you know, let the other one pick up just because it's better for everyone" (F12 mother).

Parents in the anger group mentioned the *lack of support from their partner or partner conflict* significantly more often than parents not suffering from anger. "We had this argument and fights. I had to realise that I had to stop being so bossy" (Y44 mother). The support from *other people*, such as parents, friends or professionals, were mentioned significantly more often by women. Comments included anything from practical support to listening. "I just wanted to lock myself away and I rang my mum and she said to me, "oh, perhaps he has got some trapped wind", and I went to get some stuff and it was, that's exactly what it was" (Y31 mother). Several fathers felt left out by professionals in terms of support. "I just think, you know there's a lot of support for women but there's not a lot of support for men, I mean if someone had just said to me, not every fella is delighted with the situation"(A4 father). Parents also seemed to use *comparisons with others* to normalise, justify and contextualise their own reactions and experiences. The comparisons included downward comparisons (i.e. others worse than themselves), which appeared to make the parent feel better about themselves. "Then again, my best friend when she had her first baby, I remember that she had a terrible time" (P2 mother).

On the contrary, some parents used upward comparisons (e.g., others better than themselves), which seemed to undermine their own feelings of self-worth and parental adequacy. Parents with anger used such comparative comments significantly more frequently than parents without anger. "Only just that I didn't think that I was normal and I felt really concerned about the fact that I should have been feeling really delighted about the pregnancy and afterwards I guess I was a little concerned and depressed about it and I couldn't even admit that, even to friends" (A4 father). Parents also appeared to

use comparison with other babies to justify the behaviour of their own baby. Downward comparisons were most common. “She’s fantastic and I look at other baby’s and think, oh they’re cute in a way, but she’s gorgeous” (C3 father). Again, upward comparisons were more common in parents with anger issues. “As a comparison against our friend’s babies I think it would be nice if he did sort of giggle and laugh, we just want him to be happy, but he doesn’t laugh as much as other people’s babies” (F63 father).

Self-reflective comments or analogies were used by more than two thirds of parents when talking about their experiences, as a way of making sense of their own feelings or reactions. “I don’t really know if it, what I felt was, was actually me feeling angry at my mother. Yes, where my sort of fantasy sadistic parenting or whatever, I mean she was quite sadistic in certain ways. And I think that I made quite a clear choice in that first week that I wasn’t going to [be like her]” (P6 mother). Also these reflections were significantly more common in the anger group.

***Parenthood general.*** More than half of the parents specifically mentioned *positive experiences* of parenting such as enjoyment, fulfilment, reward and feeling fortunate. “Just the loving, when they love you back; when they need you. Especially when you are breast-feeding, when they cuddle you and it’s, it’s very, very, very, what’s the word, rewarding” (Y3 mother). However, some parents also gave *negative* comments, especially if they experienced anger with the baby or suffered from postnatal mental health problems, such as finding certain practical aspects difficult or not fulfilling their parental role in the way they hoped for. “The most tricky thing is the way it changes the pace of your life and she has to have sleeps otherwise she is no good. So it does mean that you, your day will be carved up so there are only like little, very small segments that you can do something with” (P2 mother).



Half of all parents thought that the parenthood was *better than expected*. “It’s, exceeded the expectations, better. Everything and more than I expected it to be” (F44 father). A highly significant number of parents with anger issues felt that their experience of parenthood was *worse than expected*. “If you find yourself in a situation where you’re swearing with your kid you know, you are holding your baby and you are swearing, or you are holding your baby or you are changing your baby or whatever and you are having violent thoughts even though it is just a flash, even though it is just a kind of cartoon violence, that is not how it supposed to be” (P4 father). The majority of parents commented on changes in themselves. These were mainly *positive changes* with growing maturity and sense of purpose. “I think I feel more confident about my place in the world as a father. You know, more, a bit more of a sense of purpose I guess” (P8 father).

Participants’ appraisals of their *self-efficacy* as parents were both positive and negative “I do think that I’m a really good mum - I give her everything that she needs” (F1 mother). *Negative appraisals* were significantly more common in parents with mental health and anger issues who made negative comments about their own abilities. “But you just don’t want to fail. It’s pathetic if I have to hand her back to Karen. Couldn’t do anything with her. Feel a bit useless” (F11 father).

#### **2.4.2.3 Parent and Baby**

***Parent-baby relationship.*** The majority of all parents talked about their enjoyment of their *social interaction* with their baby, like singing, talking or playing. Evidence of parents trying to *interpret and understand their baby’s* emotions (mind - mindedness) and behaviours was seen in three quarters of all parents. It seemed that reasoning, such as, “she is not doing it on purpose” helped many of them to control their anger. “Well, I just think that it is not her fault. You know, nothing she is doing wrong

or nothing she is doing on purpose” (P5 mother). In contrast, there were also cases where parents showed signs of not understanding their baby or being insensitive. Significantly more parents with anger issues and postnatal mental health issues made such comments. “And you know she won’t drink the milk off me! I give her the milk bottle when she’s hungry. My wife comes in, does the same thing, and the baby will drink the milk. That’s beginning to annoy me. What’s, is this baby trying to play me up or something, on purpose” (F44 father).

When parents were asked about how their feelings for their baby developed after birth, approximately 40% of parents described a moment of instantly falling in love or loving their baby even before the birth. “I think it was instant love, really, I really realise now this is the most special stuff on earth, I don’t care about anything else” (A2 father). The remaining majority of parents admitted that it took longer for love to develop and to having ambivalent feelings towards their baby from the start, a mixture of love, guilt, unfamiliarity, fear and responsibility. This delayed feeling of love was significantly more frequent among the group of parents with anger symptoms. “I was a bit shocked that I didn’t love her the first day. What you call, attraction love, the actual physical attraction of the baby, that I didn’t fall in love with the physical attraction of the baby the first day, which was wrong of me, I felt guilty for that” (F44 father). Some parents specifically mentioned the *presence of a bond*. “I was very tearful but in a happy way. Relief, that she was perfectly healthy. There was a definite bond that developed very quickly” (F7 mother). Comments on the *absence of a bond* were significantly more frequent amongst parents with mental health problems. “It did take a long time and I did sort of sit there and sort of thing, you know, I don’t feel the bond. I was sort of worried you know. I was sort of a bit concerned thinking maybe I should have done skin-to-skin bonding straight away and stuff like that” (F4 father).

Most parents discussed how they felt when they are separated from their baby. The majority commented on *missing their baby* and not wanting to be separated even for a short period. A small number of parents, mainly women expressed feelings of being trapped and limited by their baby. “Why do I feel so stressed now, like as if I was in a cage or like, you know, in a way without exit” (Y44 mother). Parents frequently mentioned *intimate physical contact* like kissing and cuddling as a source of enjoyment. Mothers made such comments significantly more frequently than fathers. “And I love in the mornings when we’ll get her up, and I just like it that the three of us are all sort of laying there, all cuddled up, I think it seems very secure and cosy, you know” (J7 mother).

Many comments suggested that *socialising with others* helped parents cope by feeling less isolated. “It was just knowing for those two hours that you could relax a bit, and it wasn’t you on your own, it was you with other people that you’ve met” (F56 mother). *Physical play* activities such as throwing and swinging were mentioned by more than half of all the parents, but significantly more often by the anger group. “Swinging him around, I was doing that this morning and he was really laughing. He loves bouncing, that always makes him laugh” (F56 mother).

**Table 2.2 Themes and sub-themes with differences between participants with and without mental health disorders or parental anger**

	Total sample	Mental health	No mental	$\chi^2$	Parental anger	No parental	$\chi^2$
	n = 85	issue	health issue	( $\phi$ ) *	n = 23	anger	( $\phi$ ) *
	No. (%)	n = 17	n = 68		No. (%)	n = 62	
Themes and sub-themes	No. (%)	No. (%)	No. (%)			No. (%)	
<b>SECTION 1. ABOUT THE BABY</b>							
<b>Baby Characteristics</b>							
Positive infant characteristics	82 (96.5)	17 (100.0)	65 (95.6)	0.02 (.10)	22 (95.7)	60 (96.8)	0.17 (-.03)
Negative infant characteristics	49 (57.6)	9 (52.9)	40 (58.8)	0.19 (-.05)	18 (78.3)	31 (50.0)	5.49 (.25) <sup>*a</sup>
Physical description	30 (35.3)	9 (52.9)	21 (30.9)	2.09 (.18)	8 (34.8)	22 (35.5)	0.00 (-.01)
Social description	56 (65.9)	11 (64.7)	45 (66.2)	0.01 (-.01)	12 (52.2)	44 (71.0)	2.64 (-.18)
Baby is like self or partner	16 (18.8)	3 (17.6)	13 (19.1)	0.04 (-.02)	5 (21.7)	11 (17.7)	0.01 (.05)
<b>Behaviour and Needs</b>							
Sleeping	38 (44.7)	8 (47.1)	30 (44.1)	0.05 (.02)	14 (60.9)	24 (38.7)	3.33 (.20)
Feeding	46 (54.1)	9 (52.9)	37 (54.4)	0.01 (-.01)	14 (60.9)	32 (51.6)	0.58 (.08)
Crying	57 (67.1)	11 (64.7)	46 (67.6)	0.05 (-.03)	18 (78.3)	39 (62.9)	1.79 (.15)
<b>Development</b>							
Motor	81 (95.3)	17 (100.0)	64 (94.1)	0.15 (.11)	23 (100)	58 (93.5)	0.45 (.14)
Language	42 (49.4)	7 (41.2)	35 (51.5)	0.58 (-.08)	12 (52.2)	30 (48.4)	0.10 (.03)
Cognitive	50 (58.8)	11 (64.7)	39 (57.4)	0.30 (.06)	11 (47.8)	39 (62.9)	1.57 (-.14)
Social (smiling & laughing)	80 (94.1)	17 (100.0)	63 (92.6)	0.33 (.13)	21 (91.3)	59 (95.2)	0.02 (-.07)

	Total sample	Mental health	No mental	$\chi^2$	Parental anger	No parental	$\chi^2$
		issue	health issue	( $\phi$ ) *	n = 23	anger	( $\phi$ ) *
	n = 85	n = 17	n = 68		No. (%)	n = 62	
Themes and sub-themes	No. (%)	No. (%)	No. (%)			No. (%)	
<b>SECTION 2. PARENT</b>							
<b>Emotions</b>							
Disappointment	46 (54.1)	11 (64.7)	35 (51.5)	0.96 (.11)	19 (82.6)	27 (43.5)	10.31 (.35) ***
Anxiety, worry, stress	40 (47.1)	11 (64.7)	29 (42.6)	2.66 (.18)	11 (47.8)	29 (46.8)	0.01 (.01)
Self blame/guilt	38 (44.7)	11 (64.7)	27 (39.7)	3.44 (.20)	15 (65.2)	23 (37.1)	5.37 (.25) *a
Frustration/irritation	32 (37.6)	4 (23.5)	28 (41.2)	1.80 (-.15)	11 (47.8)	21 (33.9)	1.39 (.13)
Exhaustion/tiredness	23 (27.1)	6 (35.3)	17 (25.0)	0.30(.09)	10 (43.5)	13 (21.0)	4.21 (.23)
Anger	23 (27.1)	5 (29.4)	18 (26.5)	0.00 (.03)	13 (56.5)	10 (16.1)	13.87 (.40) ****
Depressed, down	16 (18.8)	5 (29.4)	11 (16.2)	0.81 (.14)	5 (21.7)	11 (17.7)	0.01 (.05)
Other: helpless, responsibility	8 (9.4)	3 (17.6)	5 (7.4)	0.70 (.14)	4 (17.4)	4 (6.5)	1.25 (.17)
Pride	30 (35.3)	6 (35.3)	24 (35.3)	0.00 (.00)	11 (47.8)	19 (30.6)	2.17 (.16)
Happiness/joy	18 (21.2)	3 (17.6)	15 (22.1)	0.00 (-.04)	6 (26.1)	12 (19.4)	0.14 (.07)
Calm/in control	15 (17.6)	4 (23.5)	11 (16.2)	0.13 (.08)	1 (4.3)	14 (22.6)	2.69 (-.21)
<b>Impulse and Control</b>							
Impulse	47 (55.3)	11 (64.7)	36 (52.9)	0.76 (.09)	22 (95.7)	25 (40.3)	20.7 (.49) ****
Loss of control/abuse	24 (28.2)	8 (47.1)	16 (23.5)	2.65 (.21)	18 (78.3)	6 (9.7)	38.95 (.68) ****

	Total sample	Mental health	No mental	$\chi^2$	Parental anger	No parental	$\chi^2$
	n = 85	issue	health issue	( $\phi$ ) *	n = 23	anger	( $\phi$ ) *
Themes and sub-themes	No. (%)	No. (%)	No. (%)		No. (%)	n = 62	
						No. (%)	
<b>Coping Strategies</b>							
Partner involvement/support	68 (80.0)	15 (88.2)	53 (77.9)	0.37 (.10)	22 (95.7)	46 (74.2)	3.58 (.24)
Partner lack of support/conflict	13 (15.3)	2 (11.8)	11 (16.2)	0.01 (-.05)	9 (39.1)	4 (6.5)	11.42 (.40) ****
Others support	40 (47.1)	8 (47.1)	32 (47.1)	0.00 (.00)	11 (47.8)	29 (46.8)	0.03 (.01)
Comparison with others re: self	37 (43.5)	6 (35.3)	31 (45.6)	0.24 (-.08)	15 (65.2)	22 (35.5)	6.03 (.27) *a
Comparison with others re: baby	41 (48.2)	7 (41.2)	34 (50.0)	0.42 (-.07)	15 (65.2)	26 (41.9)	3.64 (.21)
Self-reflection	57 (67.1)	13 (76.5)	44 (64.7)	0.85 (.10)	22 (95.7)	35 (56.5)	11.67 (.37) ***
<b>Parenthood General</b>							
Positive parenting experiences	45 (52.9)	8 (47.1)	37 (54.4)	0.30 (-.06)	12 (52.2)	33 (53.2)	0.01 (-.01)
Negative parenting experiences	14 (16.5)	4 (23.5)	10 (14.7)	0.26 (.10)	7 (30.4)	7 (11.3)	3.19 (.23)
Better than expected	42 (49.4)	5 (29.4)	37 (54.4)	3.40 (-.20)	7 (30.4)	35 (56.5)	4.54 (-.23)
Worse than expected	20 (23.5)	5 (29.4)	15 (22.1)	0.10 (.07)	12 (52.2)	8 (12.9)	14.38 (.41) ****
Social expectations	19 (22.4)	3 (17.6)	16 (23.5)	0.04 (-.06)	7 (30.4)	12 (19.4)	1.19 (.12)
Changes in self	59 (69.4)	14 (82.4)	45 (66.2)	1.68 (.14)	16 (69.6)	43 (69.4)	0.00 (.00)
Self efficacy/Positive appraisal	4 (51.8)	8 (47.1)	43 (63.2)	1.48 (-.13)	8 (34.8)	36 (58.1)	3.64 (-.21)
Self efficacy/Negative appraisal	15 (17.6)	7 (41.2)	8 (11.8)	6.20 (.31) **a	8 (34.8)	7 (11.3)	4.86 (.27) *a

	Total sample	Mental health	No mental	$\chi^2$	Parental anger	No parental	$\chi^2$
		issue	health issue	( $\phi$ ) <sup>*</sup>	n = 23	anger	( $\phi$ ) <sup>*</sup>
	n = 85	n = 17	n = 68		No. (%)	n = 62	
Themes and sub-themes	No. (%)	No. (%)	No. (%)			No. (%)	

### SECTION 3. PARENT – BABY FACTORS

#### Parent baby relationship

Social interaction	77 (90.6)	16 (94.1)	61 (89.7)	0.01 (.06)	20 (87.0)	57 (91.9)	0.08 (-.08)
Lack of mind mindedness	17 (20.0)	6 (35.3)	11 (16.2)	2.03 (.19)	12 (52.2)	5 (8.1)	17.74 (.49) ****
Love at first sight	37 (43.5)	7 (41.2)	30 (44.1)	0.05 (-.02)	5 (21.7)	32 (51.6)	6.09 (-.27) * <sup>a</sup>
Bonding present	18 (21.2)	0 (0.0)	18 (26.5)	4.23 (-.26) * <sup>a</sup>	7 (30.4)	11 (17.7)	0.95 (.14)
Separation: miss baby	48 (56.5)	10 (58.8)	38 (55.9)	0.05 (.02)	11 (47.8)	37 (59.7)	0.96 (-.11)
Feeling trapped	13 (15.3)	2 (11.8)	11 (16.2)	0.01 (-.05)	6 (26.1)	7 (11.3)	1.81 (.18)
Intimacy and contact	53 (62.4)	10 (58.8)	43 (63.2)	0.11 (-.04)	14 (60.9)	39 (62.9)	0.03 (-.02)
Socialising with others	50 (58.8)	8 (47.1)	42 (61.8)	1.21 (-.12)	14 (60.9)	36 (58.1)	0.05 (.03)
Physical play	49 (57.6)	12 (70.6)	37 (54.4)	1.46 (.13)	18 (78.3)	31 (50.0)	5.49 (.25) * <sup>a</sup>

Note. Significance \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .005$ , \*\*\*\*  $p < .001$ . <sup>a</sup> These were no longer significant after Bonferroni corrections.

## **2.5 Discussion**

This study provides details of mothers' and fathers' subjective accounts of their baby, themselves as parents and their relationship with their baby. Results suggest the presence of postnatal mental health and anger issues negatively influences aspects of all these factors, which may have negative implications on their relationship with their baby. These findings are discussed in turn below.

### **2.5.1 Perceptions of the baby**

The results indicate that most parents in this study provided a positive, rich and coherent description of their babies' characteristics and personality, which may indicate that their perceptions were primarily healthy and balanced (Zeanah & Benoit, 1995; Main, Kaplan & Cassidy, 1985). The majority of parents commented on their baby's motor and social development, with the baby's ability to smile appearing to give the parents important feedback, helping them to see the baby as a "person". Recent research (Strathearn, Fonagy & Montague, 2008) confirms the crucial importance of the infant's smile in uniquely activating reward centres in the parents' brains, giving parents a "natural high". The group of parents suffering from anger used a significantly higher number of negative references when talking about their baby compared to those without anger. This is consistent with Dollberg et al.'s study (2010) where mothers whose narratives were less joyful, more hostile and less coherent also showed lower sensitivity and more hostility in their behaviour towards their baby.

### **2.5.2 Experiences of parenting**

Most of the sample commented that parenting was accompanied by heightened emotional states – in particular negative emotions, which were described more often than positive emotions. This is consistent with previous qualitative evidence of mothers'



birth experiences. For example, Ayers (2007) found that negative emotions, such as feelings of anxiety, irritability, and frustration were predominant in women's descriptions of giving birth. As would be expected, in the current sample, negative emotions were especially prevalent amongst parents with anger or postnatal mental health issues, both of whom reported more feelings of anxiety, guilt and depression. This probably represents the nature of affective disorders where the presence of negative emotions is part of the diagnostic criteria.

Similarly, both impulses and loss of control were mentioned significantly more frequently amongst parents with anger. This higher occurrence of impulsive thoughts and loss of control in parents with anger problems is consistent with previous research (Cummings & Davies, 1994; Mammen, Kolko & Pilkonis, 2002). Parents with anger issues also specifically commented on the lack of support from their partner more often. This finding ties in with Matthey, McGregor and Ha's (2008) view of the importance of the affectional support from the partner in preventing distress in new parents.

Although it seemed like most parents used spontaneous social comparison with others as a coping strategy to normalise their experiences, parents with anger problems were found to use negative upward comparisons more often. Negative appraisals of parenting ability were also more common in parents suffering from anger or mental health problems. Previous research has indeed found that high parenting self-efficacy may act as a buffer for both parental depression, stress and relationship experiences and is also associated with positive child outcomes (Teti & Gefland, 1991). More fathers than mothers used negative appraisals of themselves as parents, which is also consistent with previous research of first time parents (Hudson, Elek & Fleck, 2001).

### **2.5.3 The parent-baby relationship**

Three quarters of all parents used comments which gave evidence of mind mindedness. However, amongst parents suffering from anger issues, more comments were made that suggested not understanding the baby. This finding is interesting, as recent research has highlighted the crucial importance of mind mindedness in the parents and its consequences for the child's development, attachment patterns and theory of mind (Meins et al., 2003). Parents with anger were less likely to fall in love with their baby at first sight (one in five) compared to parents without anger (one in two). Parents with postpartum mental health symptoms commented significantly more frequently about their absence of bonding. This is consistent with previous research, which has found that impaired parent-baby bonding is more common in parents with postnatal mental health problems, such as depression, anxiety and PTSD (e.g. Wilson & Durbin, 2010; Lovejoy et al., 2000; Parfitt & Ayers, 2009). Parents with anger problems used significantly more references to physical play with their babies. The relevance of this is unclear. One could speculate that this may indicate a more intrusive over-stimulating parental style. Previous studies have, for example, indicated that anxious mothers may use more intrusive, over stimulating behaviours, which do not directly correspond to the baby's signals (e.g., Feldman et al., 2009).

### **2.5.4 Methodological issues**

The present study has several limitations that need to be borne in mind when interpreting these results. First, this study was based on a sample that was predominantly white European and highly educated. Therefore, results may not be applicable to ethnic minority groups or those with lower levels of education. Second, quantitative analyses were based on a relatively small sample and, in some instances, frequencies in categories were small. This small sample size meant that small effects

were not identified, only medium or large. Third, the decision to combine all postpartum mental health problems into one category, due to the small prevalence of each disorder, excluded any comparisons between different postpartum diagnoses. It is therefore important that the current study is replicated and extended in larger and more representative samples. Strengths of this study are use of the in depth interview that provides a detailed insight into parent's experiences, coupled with a consideration of how these differ between parents with and without mental health or anger issues. This paper purely focused on parental anger directed towards the baby. Feelings of general irritability or anger towards other people could also be considered in future studies. Although this study did not find many significant gender differences, future studies of parenthood and postnatal mental health need to continue to include fathers. The majority of participants commented on the interview being positive and therapeutic, giving them a chance to reflect in detail on their current experiences. The identification of groups and analysis of any differences between groups was carried out after the full thematic coding was done, in an effort to limit any biases.

### **2.5.5 Implications and conclusion**

Currently, knowledge and practices for identifying parent-baby relationship problems in the community are sparse and, in the UK, health visitors have requested further training in how to identify such problems (Wilson et al., 2008). This study highlights the relevance of listening to parents' verbal accounts for understanding their relationship with their baby. Parents may benefit from talking about their perceptions and experiences, also including "taboo" subjects such as any anger towards the baby or delayed feelings of love, with their health visitor, in the early postpartum period. This could reveal potential needs for treatment but most importantly enable parents to normalise and reflect on their own experiences. This study also underlines the

importance of teaching parents to be mind-minded and to encourage parents to view their babies and themselves in positive terms. Health professionals could have a preventative role by encouraging parents to interpret the baby's intentions and feelings and to heighten their parental self-efficacy.

In conclusion, the present study suggests that the presence of postnatal mental health and anger issues in parents negatively influences the way they perceive their baby, themselves as parent and their relationship with their baby, which may have negative implications on their interaction with the baby. This study especially highlights the need for future research to consider parental anger in more detail for assessment and intervention in pregnancy, birth and the postnatal period.

### 3 The Transition to Parenthood and Mental Health in First-time

#### Parents (Article 2)

Parfitt, Y. & Ayers, S. (in press). The transition to parenthood and mental health in first-time parents. *Infant Mental Health Journal*.

#### 3.1 Abstract

This study aimed to examine the transition to parenthood and mental health in first-time parents in detail and explore any overall or within couple differences.

Semi-structured clinical interviews (Birmingham Interview for Maternal Mental Health) were carried out with 46 women and 40 men, five months after birth. Parents were assessed on pre- and postpartum anxiety, depression and postpartum PTSD, and a range of adjustment and relationship variables. A quarter of men and women reported anxiety in pregnancy, reducing to 21% of women and 8% of men after birth. Pre and postpartum depression rates were roughly equal, with 11% of women and 8% of men reporting depression. Postpartum PTSD was experienced by 5% of parents. Postpartum mental health problems were significantly associated with postpartum sleep deprivation ( $OR = 7.5$ ), complications in labour ( $OR = 5.1$ ), lack of postpartum partner support ( $OR = 8.0$ ), feelings of parental unworthiness ( $OR = 8.3$ ) and anger towards the infant ( $OR = 4.4$ ). Few gender differences were found for these variables. This study thus highlights the importance of focusing interventions on strengthening the couple's relationship, avoiding postnatal sleep deprivation and to address parents' feelings of parental unworthiness and feelings of anger towards their baby.

### 3.2 Introduction

The transition to parenthood involves major physiological, psychological and social adjustments for a couple, both positive and negative. Although many parents adapt well to the demands of parenthood, the transition to parenthood is associated with adverse effects on parental mental health such as depression and anxiety (e.g., Brockington, 2004). For example, studies show that the prevalence of postpartum depression in mothers ranges from 8% to 28% depending on time and type of assessment (e.g., Buist et al., 2008; Gavin et al., 2005; O'Hara and Swain, 1996). Depressive symptoms in pregnancy appear to be as common as postpartum depressive symptoms (Milgrom et al., 2008). Fathers' rates of depression pre- and postpartum have generally been found to be lower, ranging from 5% to 13% (Matthey, Barnett, Ungerer & Waters, 2000; Paulson & Bazemore, 2010), with highest rates at three to six months postpartum. Paternal depressive symptoms most commonly correlate with having a partner with elevated depressive symptoms (Wee, Skouteris, Pier, Richardson & Milgrom, 2011).

Anxiety disorders such as generalised anxiety disorder, phobia, obsessive compulsive disorder, panic and post-traumatic stress disorder (PTSD) also occur in men and women during the transition to parenthood (e.g., Matthey, Barnett, Howie & Kavanagh., 2003; Wenzel, Haugen, Jackson & Brendle, 2005). There is some evidence that anxiety may be more common than depression (Heron, O'Connor, Evans, Golding & Glover, 2004) with maternal postpartum rates of 16 % (Wenzel et al., 2005). Brockington, Macdonald and Wainscott (2006) found that, for women, clinically significant anxiety disorders during pregnancy were twice as prevalent as depression, but roughly equivalent postpartum. In men, evidence suggests anxiety may peak during pregnancy (Condon, Boyce & Corkindale, 2004). Parents are therefore at increased risk of a range of disorders and there is also high comorbidity between these. For example,

Brockington, MacDonald and Wainscott (2006) discovered that the majority of mothers with psychiatric problems suffered from two or more disorders (e.g., anxiety, depression, PTSD, OCD). Similarly, between 50 and 75% of women with PTSD after birth may also have depression (Parfitt & Ayers, 2009; White, Matthey, Boyd & Barnett, 2006).

A range of biological, psychological and social interrelated risk factors are associated with postpartum mental health problems, with a complex and reciprocal interaction between these. The diathesis–stress model (e.g., Burns & Machin, 2013) is one way to view how parental vulnerability factors (diathesis), such as genetic predispositions and neuro-behavioural vulnerabilities originating from early life adversity (e.g., Lai & Huang, 2011; Schlotz & Phillips, 2009; Talge, Neal & Glover, 2007), own attachment problems (Simpson & Rholes, 2008), a personal family history of mood disorder (O’Hara & Swain, 1996), traumatic early life experiences (Czarnocka & Slade, 2000), may moderate the effect of a stressful life event (e.g. childbirth) on the person’s mental health. Also, experiences of anxiety or depression in pregnancy (e.g., Correia & Linhares, 2007; Lee et al., 2007; Sutter-Dallay, Giaconne-Marcusche, Glatigny-Dallay & Verdoux, 2004) or psychological distress or obstetric complications and instrumental delivery (Henderson & Redshaw, 2013; Matthey et al., 2000; Ryding, Wijma & Wijma, 1997) increase the risk for postpartum mental health problems in women.

Sleep deprivation, both in pregnancy and postpartum, could also contribute to the development of mental health problems (Hiscock, Bayer, Hampton, Ukoumunne & Wake, 2008; Skouteris, Wertheim, Germano, Paxton & Milgrom, 2009) and potentially have negative implications for the parent-infant relationship (e.g., Pires, Andersen, Giovenardi & Tufik, 2010) by, for example, exaggerating anger towards the baby

(Cummings & Davies, 1994). Brockington, MacDonald and Wainscott (2006) highlighted dysmorphophobia (shame of body) as another less commonly researched adjustment issue for women both in pregnancy and postpartum and found evidence of dysmorphophobia in pregnancy (27%) and postpartum (31%). Additionally Gjerdingen et al. (2009) found that body dissatisfaction was associated with poorer mental health.

The quality of the relationship between the mother and the father is one of the key contributors to the adjustment to parenthood, especially for first time parents. In many cases, new parents report a reduction of their satisfaction with their relationship in the months following childbirth (e.g., Cowan & Cowan, 2002; Gjerdingen & Center, 2003; Levy-Shiff, 1994). The couple's sexual relationship may also be affected by pregnancy and birth, with a decrease of quality and frequency (e.g., Dixon, Booth & Powell, 2000; Van Brummen et al., 2006). Poor relationship satisfaction and perception of support from the partner has been identified as one of the main contributing risk factors to the development of postpartum depression (e.g., Milgrom et al., 2008; Wee et al., 2011) and anxiety (Buist, Morse & Durkin, 2003). Conversely, relationship difficulties may be a consequence of depression and anxiety (Wenzel et al., 2005), and thus indicates the bi-directional association between these. Negative consequences of postpartum PTSD on a couple's sexual relationship have also been documented (Fones, 1996; Nicholls & Ayers, 2007). Combined, this research thus suggests that parental mental health problems may put an extra strain on the couple's relationship or vice versa.

Brockington, Aucamp and Fraser (2006) emphasise the development of the parent-baby relationship as the most important psychological process for parents. This relationship starts in pregnancy where the mother may interact with the foetus and involve the partner to varying degrees. Stern (1995) developed the notion of the "motherhood constellation" to help explain the unique way new or expectant mothers



(and fathers) organise their mind-sets to caring for and relating to their infant.

Unplanned pregnancy and poor bonding to the foetus has been associated with impaired postpartum bonding between the parent and the baby (e.g., Brockington, Aucamp & Fraser, 2006; Siddiqui & Hagglof, 2000). They also suggested that persistent negative feelings towards the baby may lead to a negative emotional response and /or pathological anger with aggressive impulses. There is very little research that examines the timing of parental bonding with the baby, with only one known earlier study by Robson and Moss (1970) reporting that most mothers' feelings grew during the first three months, from feeling distanced and tired at 3 to 4 weeks postpartum to seeing the baby as a person at 4 to 6 weeks. However, they did not look at this in relation to parental mental health.

Parent-baby relationship problems have been associated with poor maternal mental health. For example, in a psychiatric sample, Brockington (2004) found an impaired parent-baby relationship in 10% to 25% of the mothers. This is comparative to prevalence rates of 3% to 9% in a general population (Righetti-Veltema, Conne-Perrard, Bousquet & Manzano, 2002; Skovgaard, Houmann, et al., 2007). Although parent-baby relationship problems do not occur in all parents with mental health disorders, there is evidence for a negative impact of depression (for a review, see Field, 2010), anxiety (e.g., Glasheen, Richardson & Fabio, 2010, for a review) and PTSD (e.g., Parfitt & Ayers, 2009) on this relationship. Similarly, a meta-analytic review (Wilson & Durbin, 2010) found that depressed fathers showed decreased positive and increased negative behaviours in their parenting, which is corresponding to findings amongst mothers (Lovejoy, Graczyk, O'Hare & Neuman, 2000). Less consideration has been given to parental anger, but one research study indicates it is associated with both depression and anxiety (Mammen, Pilkonis & Kolko, 2000). Also, Wisner, Peindl, Gigliotti and

Hanusa (1999) found that 54% of women with postpartum depression experienced aggressive thoughts about harming their baby. To date, no known studies have included fathers in the examination of associations between anger and mental health

Overall, this research shows the transition to parenthood is an important time when parents are at risk of a range of mental health, adjustment and relationship problems. However, very few studies have looked at this transition in depth for both men and women, or compared this transition within couples. The present study contributes to knowledge in three ways. Firstly, the use of structured clinical interviews covering a broad range of social, psychological and psychiatric issues enables detailed analysis of the transition to parenthood in relation to mental health, relationships and adjustment factors. Secondly, to our knowledge, fathers have not been included in this type of in-depth parental interview and thirdly, with a few exceptions, previous studies regarding parental mental health mainly address mean differences between women and men, not within couple comparisons. The aims of the present study were therefore; (i) to provide a detailed descriptive examination of the transition to parenthood and mental health in men and women, and (ii) to explore which relationship and adjustment factors are most associated with postpartum mental health problems. Additionally, it aimed to explore any mean level differences between men and women and to assess the degree of similarity of mothers and fathers within families.

### **3.3 Method**

#### **3.3.1 Participants**

Participants were recruited from the Sussex Journey to Parenthood Study, a longitudinal questionnaire study that followed a total of 141 parents from pregnancy to the postpartum period. Inclusion criteria were that participants were expecting their first baby, were cohabiting, fluent in English and were over 18 years old. Exclusion criteria

were if either member of the couple was currently being treated for a psychiatric disorder or if the baby had died before or after birth. Participants were invited for an interview if the family already had agreed to a previous home observations ( $n = 48$  families). The current sample consisted of 86 participants, 46 women and 40 men from those families. Women were aged between 18 and 46 years ( $M = 32.63$  years,  $SD = 5.70$ ) and men were aged between 26 and 44 years ( $M = 33.58$ ,  $SD = 7.33$ ). The majority of participants in the current study were Caucasian (82%) and had university level education (74 %). At the time of the interview, babies were between 4 and 8 months old ( $M = 5.38$  months,  $SD = 1.04$ ). The length of the couple's relationship ranged from 12 to 308 months ( $M = 75.21$  months,  $SD = 54.48$ ). Participant who agreed to be interviewed ( $n = 86$ ) did not differ from nonparticipants ( $n = 55$ ) with regards to any demographic (e.g., age, ethnicity, marital status, qualification or length of relationship) or mental health variables.

### **3.3.2 Measures**

The Birmingham Interview for Maternal Mental Health (BIMMH; 5<sup>th</sup> edition, Brockington, Chandra, et al., 2006) was used. A number of reliability studies (e.g. Brockington, Aucamp & Fraser, 2006; Chandra, Bhargavaraman, Raghunandan & Shaligram, 2006) have been carried out during the development of this semi- structured interview and it has also been used to validate the Postpartum Bonding Questionnaire (Brockington, Fraser & Wilson, 2006). It is divided into eight sections, covering the social, psychological and psychiatric course of pregnancy, birth and months after the birth. As part of the BIMMH parents are assessed on their degree of pre- and postpartum anxiety and depression on a 4-point scale, 0 to 3 (none, mild, moderate and severe) and postpartum PTSD on a 3-point scale, 0 to 2 (none, some evidence and severe). For clarity of presentation, in accordance with how other diagnostic interview

assessments are reported and in line with previous studies using the BIMMH (e.g., Brockington, McDonald & Wainscott, 2006), these were converted into binary variables indicating presence or absence of mental health. A cut off of  $\geq 2$  (moderate or severe disorder) was used to identify those with mental health problems. Adjustment and relationship variables were also categorised into binary variables indicating the presence or absence of adjustment or relationship problems. Similar to the mental health variables, a cut off of  $\geq 2$  (moderate problems) was used in the majority of items (See Table 3.2 – 3.4).

### **3.3.3 Procedure**

Ethical approval was obtained from the NHS Research Ethics Committee (Appendix C) and the University Research Governance Committee. Participants already enrolled in the Sussex Journey to Parenthood study, who had previously agreed to a home-visit, were sent a letter three months after birth inviting them to take part in this interview study and offering an incentive (baby shop vouchers). Those who agreed to take part were contacted by phone or email to arrange an interview date. Interviews were conducted in the participants' homes, approximately 5 months postpartum. Male and female partners were interviewed separately by an experienced healthcare professional. Written informed consent was obtained before the start of the interview and confidentiality, anonymity and the right to withdraw at any time was assured. After the interview all participants were debriefed. Interviews took between 75 minutes and 120 minutes and were audio recorded. All responses to the interviews were rated, either during the interview or immediately after the completion of the interview according to the Birmingham Interview schedule. Verbatim responses of the participants' own words were also recorded where appropriate and possible. An independent researcher rated approximately 10% of the interviews from the audio recordings to check reliability of

the ratings. The intra class correlation coefficient (ICC) was calculated (two-way random, absolute agreement, single measure) and showed excellent agreement between the raters with an average total of  $ICC = .83$  for the items included in the study.

### **3.4 Results**

In accordance with the three aims of the study, a descriptive account of both parents' transition to parenthood is reported together with explorations of any differences in this transition in the context of parental gender and mental health. The first section presents parental mental health for men and women in the sample. Following this, adjustment and relationship problems are examined for mothers and fathers with and without mental health problems, using chi-square, odds ratios and correlations. The final section employs logistic regression in order to identify key factors that are associated with postpartum mental health problems.

#### **3.4.1 Mental health and parenthood**

The proportion of men and women who reported mental health problems in pregnancy or in the postpartum is given in Table 3.1. This shows that approximately a quarter of men and women reported moderate to severe anxiety in pregnancy. This reduced after birth to 15% in the whole sample, but particularly reduced for men (8%). Table 3.1 also shows that the prevalence of moderate to severe depression was the same pre- and postpartum (10.9% in women; 7.5% in men). Comorbidity was common. In pregnancy, all men and women with depression had comorbid anxiety whilst after birth, 33.3% of women and men with mental health problems suffered from comorbid depression and anxiety. Additionally, 8.3% of women with postpartum mental health problems presented with comorbid PTSD, depression and anxiety. There was however no partner comorbidity of postpartum mental health. Only one gender difference regarding mental health was found, which showed that women on average suffered from

postpartum anxiety more frequently than men ( $\chi^2 (1) = 3.38, p = .05$ ). Within couple comparisons (Table 3.1) showed no significant associations of mental health between the parents, apart from for depression and total mental health issues in pregnancy.

**Table 3.1 Prevalence of mental health problems during pregnancy and after birth**

	Total	Women	Men		Correlations
	N =86	n = 46	n = 40		between
	No. (%)	No. (%)	No. (%)	OR	men and
Mental health	(95% CI)	(95%CI)	(95% CI)	(95%CI)	women <sup>e</sup>
Anxiety (pregnancy)	21 (24.4)	11 (23.9)	10 (25.0)	0.83 (0.31 –	.29
	(15.3, 33.5)	(11.6, 36.2)	(11.6, 38.4)	2.18)	
Anxiety	13 (15.1)	10 (21.7)	3 (7.5)	3.43* (0.87	.08
(postpartum) <sup>a</sup>	(7.55,22.69)	(9.8, 33.7)	(-0.7, 15.7)	– 13.47) <sup>d</sup>	
Depression	8 (9.3)	5 (10.9)	3 (7.5)	1.50 (0.34 –	.34*
(pregnancy)	(3.2, 15.4)	(1.9, 19.9)	(-0.7, 15.7)	6.73) <sup>d</sup>	
Depression	8 (9.3)	5 (10.9)	3 (7.5)	1.50 (0.34 –	-.16
(postpartum) <sup>b</sup>	(3.2, 15.4)	(1.9, 19.9)	(-0.7, 15.7)	6.73) <sup>d</sup>	
Posttraumatic stress	4 (4.7)	2 (4.3)	2 (5.0)	0.86 (0.12 –	.17
	(0.2, 9.1)	(- 1.5, 10.2)	(-1.8, 11.8)	6.43) <sup>d</sup>	
Total mental health	22 (25.6)	11 (23.9)	11 (27.5)	0.83 (0.31 –	.32*
issues (pregnancy)	(16.4, 34.8)	(11.6, 36.3)	(13.7, 41.3)	2.18)	
Total mental health	18 (20.9)	12 (26.1)	6 (15.0)	2.00 (0.67 –	.11
issues (postpartum) <sup>c</sup>	(12.3, 29.5)	(13.4, 38.8)	(3.9, 26.1)	5.94)	

*Note.* OR = odds ratio; CI = confidence interval. <sup>a</sup> 9 parents (6 women & 3 men) also suffered from anxiety in pregnancy, <sup>b</sup> 2 parents (1 woman & 1 man) also suffered from depression in pregnancy, <sup>c</sup> 9 parents (6 women & 3 men) also experienced mental health problems in pregnancy. Chi Square test <sup>\*\*</sup> <.01 <sup>\*\*\*</sup> <.005. <sup>d</sup> Fischer's exact test conducted due to cell frequencies < 5. <sup>e</sup> within couples, \**p* <.05, \*\**p* <.01, Spearman's (*rho*).

### 3.4.2 Adjustment to pregnancy and after birth

Table 3.2 shows the main adjustment and birth variables in pregnancy and postpartum together with odds ratios and chi-square significance levels for parents with and without postnatal mental health problems. No significant overall mean gender differences were found for any of the adjustment variables. Therefore, separate information for men and women is not presented. However, the within couple associations are given in Table 3.2, showing that mothers and fathers have reported similar experiences regarding their adjustments to pregnancy, birth and after birth. Approximately a quarter of parents reported having had ambivalent or negative feelings towards parenthood in pregnancy. Abnormal irritability resulting in angry silence or outbursts and arguments was also common in pregnancy, and even more so after birth.

Poor maternal physical health was evident amongst a majority of mothers in pregnancy and a third of mothers after birth. The mean duration of postpartum physical discomfort for mothers was 47 days (*SD* 44.8; range 0 - 180). Mothers also suffered from body dissatisfaction (dysmorphophobia), especially postpartum when a third of women felt ashamed of their body. Sleep deprivation was most commonly reported after birth, with more than half of all parents reporting losing two or more hours of sleep a night for a mean duration of 12 weeks (*SD* 9.0). Also, as Table 3.2 shows, parents with postpartum mental health problems were significantly more likely to suffer from sleep deprivation than those without. Almost half of parents (40% of mothers and 56% of fathers) appraised the birth experience as a very distressing or painful experience. Complications in labour were common, with 41% of babies delivered by forceps or ventouse, 11% by elective caesarean section and 24% by emergency caesarean section. Parents with postpartum mental health problems were five times more likely to have experienced complications in labour than parents without mental health problems.

**Table 3.2 Adjustment in participants with and without postpartum mental health problems**

	Mental health problem <i>n</i> = 18 <i>No. (%)</i>	No mental health problem <i>n</i> = 68 <i>No. (%)</i>	<i>OR</i> (95% CI)	Correlations between men and women <sup>d</sup>
<b>Pregnancy</b>				
Poor adjustment	8 (44.4)	16 (23.5)	2.6 (0.9, 7.7)	.33* <sup>e</sup>
Irritability	6 (33.3)	13 (19.1)	2.1 (0.7, 6.7)	.23
Sleep insomnia	3 (16.7)	4 (5.9)	2.8 (0.7, 11.5) <sup>c</sup>	.44**
Dysmorphophobia <sup>b</sup>	4 (22.2)	4 (5.9)	4.6 (1.0, 20.5) <sup>c</sup>	.39* <sup>e</sup>
Poor physical health <sup>a, b</sup>	14 (77.8)	39 (57.4)	2.6 (0.8, 8.7)	.78**
<b>Birth and postpartum</b>				
Distress/pain during birth	12 (66.7)	28 (41.2)	2.9 (1.0, 8.5)	.64**
Dissatisfaction with birth	6 (33.3)	16 (23.5)	1.6 (0.5, 5.0)	.23
Complications in labour <sup>b</sup>	13 (72.2)	23 (33.8)	5.1 (1.6, 16.0)**	.98**
Irritability	8 (44.4)	17 (25.0)	2.4 (0.8, 7.1)	-.04
Sleep deprivation	16 (88.9)	35 (51.5)	7.5 (1.6, 35.4)**	.72**
Dysmorphophobia <sup>b</sup>	8 (44.4)	17 (25.0)	2.4 (0.8, 7.1)	.47* <sup>e</sup>
Physical discomfort <sup>b</sup>	7 (38.9)	19 (27.9)	1.6 (0.6, 4.9)	.77**

*Note.* *OR* = odds ratio; *CI* = confidence interval. <sup>a</sup> Cut-off  $\geq 1$  used. All other cut-offs  $\geq 2$ . <sup>b</sup> For the men in the sample, these questions were answered in relation to their partner. Chi Square test \*\*<.01 \*\*\*<.005. <sup>c</sup> Fischer's exact test conducted due to cell frequencies < 5. <sup>d</sup> within couples, \* $p < .05$ , \*\* $p < .01$ , Spearman's (*rho*). <sup>e</sup> These were no longer significant after Bonferroni corrections.



### **3.4.3 The transition to parenthood and the couple's relationship**

Relationship and support variables during pregnancy and postpartum for parents with and without mental health problems are reported in Table 3.3. Gender differences are not presented, as no overall significant differences were found between men and women. Parents within the same family are also seen to experience their relationship with their partners and others in similar ways, with the majority of maternal and paternal variables showing large sized positive correlations with each other. It can be seen that generally a higher proportion of parents reported a deterioration of their partner relationship and support postpartum compared to in pregnancy, with significantly more parents with mental health problems reporting insufficient partner support. A deterioration of the sexual relationship, with reduced or complete loss of libido was reported by around three quarters of all parents in pregnancy and after birth, with half of parents (51%) not yet having returned to usual sexual relations at the time of the interview (5 months postpartum).

**Table 3.3 Relationships and support in participants with and without postpartum mental health problems**

	Mental health problem n = 18 No. (%)	No mental health problem n = 68 No. (%)	OR (95% CI)	Correlations between men and women <sup>d</sup>
<b>Pregnancy</b>				
Poor partner relationship	2 (11.1)	6 (8.8)	1.3 (0.2, 7.0) <sup>c</sup>	.42**
Poor partner support	2 (11.1)	6 (8.8)	1.3 (0.2, 7.0) <sup>c</sup>	.46**
Poor sexual relationship	10 (55.5)	52 (76.5)	0.4 (0.1, 1.1)	.72**
Poor family relationship	2 (11.1)	5 (7.4)	1.6 (0.3, 8.9) <sup>c</sup>	-.03
Poor relationship friends	8 (44.4)	16 (23.5)	2.6 (0.9, 7.7)	.20
Lack of network support	3 (16.7)	17 (25.0)	0.6 (0.1, 2.3) <sup>c</sup>	.53**
Lack of support in labour <sup>a</sup>	1 (5.6)	2 (2.9)	1.9 (0.2, 22.7) <sup>c</sup>	-
<b>Postpartum</b>				
Poor partner relationship	4 (22.2)	8 (11.8)	2.1 (0.6, 8.1) <sup>c</sup>	.52**
Poor partner support	7 (38.9)	5 (7.4)	8.0(2.2,29.8)**	.55**
Poor sexual relationship	13 (72.2)	54 (79.4)	0.7 (0.2, 2.2)	.63**
Poor family relationship	2 (11.1)	3 (4.4)	2.7 (0.4,17.6) <sup>c</sup>	-.14
Poor relationship friends	8 (44.4)	18 (26.5)	2.2 (0.8, 6.5)	.28
Lack of network support <sup>a</sup>	5 (27.8)	8 (11.8)	2.9 (0.8, 10.3)	.71**

*Note.* OR = odds ratio; CI = confidence interval. <sup>a</sup> Cut-off  $\geq 1$  used. All other cut-offs  $\geq 2$ . <sup>b</sup> For the men in the sample, these questions were answered in relation to their partner. Chi Square test \*\* <.01 \*\*\* <.005. <sup>c</sup> Fischer's exact test conducted due to cell frequencies < 5. <sup>d</sup> within couples, \* $p < .05$ , \*\* $p < .01$ , Spearman's ( $\rho$ ).

#### 3.4.4 Formation of the parent-baby relationship

Table 3.4 shows variables relating to the parent-baby relationship. In pregnancy, approximately a fifth of all parents (5 women and 11 men) reported prenatal bonding problems with minimal or no interaction with the foetus, whilst postpartum bonding problems with absent or ambivalent feelings for their baby were reported by fewer parents. Although the majority of parents felt extreme joy, pride or satisfaction when they first saw their new born baby, many parents (30 % of women and 10 % of men) experienced an initial negative reaction to their baby. This was the only significant average difference between women and men's experiences concerning the parent-baby relationship ( $\chi^2(1) = 5.40, p = .02$ ). Most of the maternal variables related to the parent-baby relationship, such as pre and postnatal bonding and reports of the baby's temperament showed medium or large positive correlations with the equivalent paternal variables. Interview data further revealed that the mean onset of positive feelings for the baby was 2.5 weeks ( $SD\ 4.1$ ; range 0 – 20 weeks), with parents suffering from postnatal mental health problems reporting a slower onset of positive feelings ( $M = 4$  weeks) compared to the parents without mental health issues ( $M = 2$  weeks). Feelings of parental unworthiness, with thoughts of not being fit to look after the baby, were significantly more frequent in parents with postpartum mental health. Strong feelings of anger towards the baby were also significantly more common amongst parents with mental health problems, who were four times more likely to report this. Impulses to treat the baby roughly, shake, strike or stop the baby breathing on one or more occasion (but with no actual physical abuse) were evident in a fifth of all parents, but no differences were found between men and women or between parents with or without mental health problems.

**Table 3.4 Perceptions of the baby and parent-baby relationship in participants with and without postpartum mental health problems**

	Mental health problem <i>n</i> = 18	No mental health problem <i>n</i> = 68	<i>OR</i> (95% CI)	Correlations between men and women <sup>c</sup>
Parent-baby relationship	<i>No.</i> (%)	<i>No.</i> (%)		
Prenatal bonding problems	2 (11.1)	14 (20.6)	0.5(0.1, 2.3) <sup>b</sup>	.49**
Negative reaction to newborn	7 (38.9)	11 (16.2)	3.3 (1.0,10.4)	.30
Feelings for baby absent or ambivalent	3 (16.7)	3 (4.4)	4.3 (0.8, 23.6) <sup>b</sup>	.50**
Feelings of parental unworthiness <sup>a</sup>	5 (27.8)	3 (4.4)	8.3 (1.8, 39.3) <sup>b</sup> **	-.08
Anger towards the baby	10 (55.6)	15 (22.1)	4.4(1.5,13.1)**	.26
Rough treatment of the baby <sup>a</sup>	7 (38.9)	14 (20.6)	2.5 (0.8, 7.5)	-.02
Baby: poor condition at birth <sup>a</sup>	6 (33.3)	12 (17.6)	2.3 (0.7, 7.5)	.87**
Baby: difficult temperament <sup>a</sup>	8 (44.4)	16 (23.5)	2.6 (0.9, 7.7)	.87**

*Note.* *OR* = odds ratio; CI = confidence interval. <sup>a</sup> Cut-off  $\geq 1$  used. All other cut-offs  $\geq 2$ . Chi Square test \*\* <.01. <sup>b</sup> Fischer's exact test conducted due to cell frequencies < 5. <sup>c</sup> within couples, \**p* <.05, \*\**p* <.01, Spearman's (*rho*).

### 3.4.5 Factors associated with postpartum mental health

Logistic regression (forced entry) was used to identify which of the above factors was most strongly associated with postpartum mental health problems. All the variables that differed significantly between parents with and without postpartum mental health problems were entered into the model (see Tables 3.2 – 3.4). Results are shown in Table 3.5 and it can be seen that five variables remained in the model. This final model was significant and accounted for 48% of the variance. It correctly identified 61% of parents with postpartum mental health problems and 88% of parents without postpartum

mental health problems; with an overall correct classification rate of 83%. However, only three of the five predictors made an independent significant contribution. These were lack of partner support, feelings of parental unworthiness, and anger towards the infant. It was not possible to perform logistic regressions on men and women separately, as the small sample meant that the frequency in some cells was too low to perform these analyses successfully. However, to check that gender was not a confounding factor the regression was re-run with gender entered on the first step. This showed gender did not make significant contribution to the model or change the pattern of results.

**Table 3.5 Logistic regression of the role of adjustment and relationship variables in risk for postpartum mental health problems.**

Dependent variable	Variables in the model	B (SE)	OR (95% CI)	Overall model statistics
Postpartum mental health problems	Lack of partner support	1.80 (0.84)*	6.06 (1.16, 31.57)	$\chi^2 (5) = 31.41^{***}$
	Complications in labour	1.32 (0.73)	3.73 (0.90, 15.49)	$R^2 = .48$
	Sleep deprivation	1.29 (0.96)	3.63 (0.55, 23.93)	
	Feelings of parental unworthiness	2.40 (0.96)**	11.01(1.68, 72.21)	
	Anger towards the baby	1.79 (0.73)**	5.96 (1.43, 24.82)	

*Note.*  $R^2$  = Nagelkerke; OR = odds ratio; CI = confidence interval, N = 86, \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

### **3.5 Discussion**

This study provides a detailed examination of men and women's transition to parenthood and mental health. The findings show that both men and women can suffer from mental health problems in pregnancy and postpartum, with anxiety being more common than depression both in pregnancy and after birth, although these are often interrelated with high co-morbidity rates. There were indications of a decline in relationships after birth, with more people experiencing relationships problems after birth than in pregnancy, especially amongst parents suffering from postpartum mental health problems who also reported significantly more feelings of anger towards their baby, lack of partner support, parental unworthiness, sleep deprivation and complications during the birth. Only one overall significant gender difference was found, which was that women on average reacted more negatively to the new born than men. Comparisons of maternal and paternal variables showed that parents within the same couple have similar experiences in their transition to parenthood in terms of adjustments and relationships, but not with regards to most mental health issues. These findings are discussed in turn below before looking at methodological limitations and possible implications for future research.

#### **3.5.1 Parental mental health and adjustment**

The results of this study substantiate other studies that show a proportion of both men and women suffer from mental health problems during pregnancy and after birth. For example, the 10% prevalence of depression in pregnancy and postpartum found here is similar to rates found in other studies (O'Hara & Swain, 1996; Buist et al., 2008, Paulson & Bazemore, 2010). The finding that more participants suffered from anxiety in pregnancy compared to postpartum is also consistent with other studies (Heron et al., 2004, Wenzel et al., 2005). Similarly, the finding that women in the study had higher

rates of postpartum mental health problems than men is consistent with epidemiological research (Ramchandani et al., 2005). The occurrence of comorbidity between several mental health problems is also comparable to previous studies (e.g., Brockington, MacDonald & Wainscott, 2006; White et al., 2006) and highlights the importance of being aware of the possible interaction of combinations of psychological issues when diagnosing and treating mental health problems in parents. Some researchers therefore suggest that “postnatal mood disorder” (PMD), may be a more suitable term to use, as it may be more useful to view depression and anxiety as part of the same continuum of stress instead of separating them into separate diagnoses (Matthey et al., 2003).

A few other interesting findings came up in this study. The first is that anxiety was more prevalent than depression in pregnancy – and the same is found for women after birth. This finding is supported by other empirical studies (Lee et al, 2007; Ross & McLean, 2006; Wenzel et al., 2005) and suggests anxiety may be more common than depression during the perinatal period. This is of concern, given the evidence that anxiety in pregnancy may have such wide ranging effects on foetal and infant neuro-behavioural development (e.g., Correia & Linhares, 2007; Van Den Bergh, Mulder, Mennes & Glover, 2005). More research is therefore required to explore the prevalence and effect of anxiety disorders in pregnancy and after birth.

Second, similar to previous literature which views poor mental health in pregnancy as a potential risk factor for postpartum mental health difficulties (e.g., Sutter-Dallay, et al., 2004), this study found that half of the parents (six women and three men) suffering from mental health problems postpartum also experienced mental health problems in pregnancy. For example, 70% of parents with pregnancy anxiety also reported anxiety after birth. This emphasises the importance of early identification of parental distress in order to help prevent problems postpartum, and to reduce negative epigenetic effects on

the fetus and infant.

Finally, parents with postpartum mental health problems were more likely to report obstetric complications and sleep deprivation after birth, which is consistent with research showing that women with birth complications, such as emergency caesarean section, suffer from higher levels of PTSD symptoms (Ryding et al., 1997) and research suggesting that maternal depression is associated with sleep problems in the infant (Hiscock et al., 2008). The effects of parental sleep deprivation need further attention, especially as it may also be a risk factor for impaired parent-baby relationships (Pires et al., 2010) and development of parental anger (Cummings & Davies, 1994). However, the direction of causality is difficult to discern as mental health problems may be both a cause and outcome of these factors.

### **3.5.2 Relationships and parental mental health**

The findings that relationship satisfaction reduced after birth, the couples' sexual relationship declined both in pregnancy and postpartum and that parents with postpartum mental health problems perceived significantly less partner support are also broadly consistent with other research (e.g., Bateman & Bharj, 2009; Dixon et al., 2000; Gjerdingen & Center, 2005). This highlights the central role the couple's relationship could play in exaggerating or helping the mental health of new parents or vice versa and the need for interventions to target this to avoid long term implications

The slower onset of positive feelings for their baby ( $M = 4$  weeks) amongst parents with mental health problems in the current sample is an interesting new finding which may have important clinical implications in terms of helping new parents to bond with their baby as early as possible. The high proportion of parents in the current study reporting strong feelings of anger towards their baby, especially amongst parents with mental health problems could be cause for concern. In connection with this result,



Mammen et al. (2000) found that parental anger may be an important mediator between maternal mental health and actual parent to child aggression. Together this points to that these kinds of negative feelings may be common amongst new parents and emphasizes the importance of future research to include measures of parental anger when considering the link between mental health and the parent-baby relationship.

### **3.5.3 Methodological issues**

The study has a number of strengths and limitations that need to be considered before drawing conclusions. The strengths are that it is the first study to look in depth at mental health and the transition to parenthood in both men and women, using a semi-structured clinical interview specifically designed to examine adjustment to parenthood. However, in contrast to standard clinical interviews (e.g., Spitzer, Williams, Gibbon & First, 1989), the BIMMH is not a diagnostic interview in that it does not measure all DSM or ICD diagnostic criteria. Care should therefore be taken when extrapolating the prevalence rates of parental mental health found in this study, and it should be noted that the findings should be viewed as symptoms consistent with diagnosis rather than as an actual diagnosis. The retrospective measurement of pregnancy variables means these may be subjected to biased recall and the design of the study does not therefore enable examinations of causal pathways. Prospective, longitudinal studies are therefore needed to corroborate these findings.

Other methodological issues include that the sample was predominantly white European, well-educated and older age ( $M = 32.6$  years for mothers, compared to the UK national average of  $M = 27.9$  years). It is therefore important to explore whether these findings are applicable to other demographic groups. For example, evidence suggest that socio-economic vulnerability factors such as low education, unemployment (Deater-Deckard, Pickering, Dunn & Golding, 1998) and younger age (Gjerdingen &

Chaloner, 1994) increase the risks for parents in developing postpartum mental health problems. Although the sample was relatively large for an in-depth interview study such as this, the sample size meant that the study is statistically under powered to find effects. This may have contributed to the wide confidence intervals observed for some of the variables, which indicates uncertainty regarding the true effect size. The small sample also restricted possibilities to perform separate logistic regression for mothers and fathers or to include both maternal and paternal variables in regression analyses to predict postnatal mental health separately for each gender. It should be noted that caution needs to be taken regarding the interdependency of scores between the partners in the same couple. Further research is therefore needed on larger, more representative samples to substantiate these results. Larger samples would also enable research to examine patterns of differences between parents with postpartum depression, anxiety and PTSD and make further within couples and gender comparisons.

### **3.5.4 Conclusions and implications**

In conclusion, this study substantiates research showing that a proportion of both men and women suffer from mental health difficulties, such as depression and anxiety during pregnancy and after birth. Results also indicate that the main variables associated with postpartum mental health problems were lack of partner support, parental feelings of unworthiness and parental anger. Overall gender differences and within couple differences were minimal. However, further research is needed to examine the direction of causality between adjustment and relationship factors and mental health further, in larger more representative samples of both parents. The importance of parental anger in mental health and for the parent-baby relationship also requires more attention in future research and interventions. Another implication of the present study is that interventions

targeting men and women's sense of worthiness in their new role as parents may be beneficial to their mental health.

## **4 Factors associated with the parent-baby bond in men and women:**

### **A prospective study (Article 3)**

#### **4.1 Abstract**

**Purpose:** This study aimed to prospectively examine the impact of parental mental health (PTSD, depression and anxiety), the couple's relationship quality and infant temperament on the parent-baby bond in first time mothers and fathers.

**Methods:** 75 women and 66 men completed questionnaire measures during pregnancy, and at three and 15 months postpartum, assessing mental health symptoms, the parent-baby bond, the couple's relationship and infant characteristics.

**Results:** Results indicated that the parent-baby bond was associated with parental mental health, the couple's relationship and infant characteristics. The couple's relationship during pregnancy and the infant's temperament at three months were the most important predictors for the parent-baby bond three months postpartum for both men and women. At 15 months postpartum, after accounting for the parent-baby bond at three months, only concurrent infant temperament remained a significant predictor for women; whilst men's concurrent affective symptoms and relationship with their partner in pregnancy were significant predictors. Parents experienced significantly higher anxiety symptoms in pregnancy compared to postpartum. Very few significant gender differences were found, apart from women reporting more mental health symptoms than men.

**Conclusions:** This study highlights the significance of the couple's relationship in pregnancy on the development of the parent-baby bond. Providing support to women and men during pregnancy and early parenthood may strengthen the couple's relationship, the perceptions of their baby and pick up mental health problems early to avoid any impairment of the parent-baby bonding process.

## **4.2 Introduction**

The formation of a close positive early relationship between a parent and their baby is widely viewed as important for a range of child outcomes, such as social, emotional and cognitive development. Additionally it may serve as a protector for child abuse and neglect. Impaired parent-baby relationships have been estimated to range between 3 -9 % in the general population (Righetti-Veltema, Conne-Perrard, Bousquet & Manzano, 2002; Skovgaard, Houmann, et al., 2007) and between 10 – 25% in psychiatric samples (Brockington, 2004). Belsky's model of determinants of parenting (1984) suggests there are three primary determinants of the quality of parent-baby relationship. In order of priority these determinants are the psychological well-being of the parent, the contextual sources of stress and support (e.g., the couple's relationship), and the characteristics of the child (e.g., temperament).

### **4.2.1 Parental mental health**

If a parent suffers from mental health problems, Belsky (1984) suggests their psychological resources may be impeded and their relationship with their baby affected. Evidence confirms that the transition to parenthood, both in pregnancy and in the early postpartum period, is associated with an increased vulnerability for mental health problems, such as depression (Buist et al., 2008; Milgrom et al., 2008; Matthey, Barnett, Ungerer & Waters, 2000; Paulson & Bazemore, 2010), anxiety (Brockington, Macdonald & Wainscott, 2006; Lee et al., 2007) and PTSD (Ayers & Pickering, 2001; Bradley, Slade & Leviston, 2008; Zambaldi, Cantillon & Sougey, 2009, for a review) in both parents, with higher prevalence rates amongst women (e.g., Matthey et al., 2000; Ramchandani et al., 2005). A recent study (Iles, Slade & Spiby, 2011) also suggests that psychological symptoms of depression and PTSD could be related within couples and a systematic review (Wee, Skouteris, Pier, Richardson & Milgrom, 2011) indicated that

paternal depression was significantly associated with maternal depression. Findings regarding the course of mental health during the transition to parenthood are inconclusive, with some studies suggesting higher rates of mental health problems in pregnancy both in women and men, especially for anxiety (e.g., Buist, Morse & Durkin, 2003; Figueiredo & Conde, 2011; Heron, O'Connor, Evans, Golding & Glover, 2004, whilst others show higher rates in the early postpartum, in particular for depression (e.g., Gavin et al., 2005; Paulson & Bazemore, 2010). However, the majority of studies measure mental health only during the first few months after birth up to one year postpartum (e.g., Lee et al., 2007; White, Matthey, Boyd & Barnett, 2006; Leeds & Hargreaves, 2008). There is a relative lack of studies assessing mental health symptoms in pregnancy and beyond a year after birth, and comparing mothers' and fathers' mental health symptoms over time.

The recognition that mental disorders during pregnancy and the postnatal period can have serious consequences for women, their partners and their babies has been highlighted in psychological literature, especially in relation to maternal postnatal depression, with reports of deficient interactive patterns between mother and baby, such as lack of contingency, reciprocity, affection and sensitivity and instead increased maternal intrusiveness or withdrawal (Broth, Goodman, Hall & Raynor, 2004; Murray, Fiori-Cowley, Hooper & Cooper, 1996) or attachment problems (Nagata, Nagai, Sobajima, Ando & Honjo, 2003). Paternal depression has also been shown to have negative effects on the parenting behaviours of fathers (for a meta-analysis, see Wilson & Durbin, 2010). Some evidence suggests bonding difficulties may also arise in parents suffering from childbirth related PTSD (Muzik et al., 2013; Nicholls & Ayers, 2007; Parfitt & Ayers, 2009). Although these and several other studies (e.g., Brockington, Aucamp & Fraser, 2006; Edhborg, Matthiesen, Lundh & Widstrom, 2005) have looked

at parent-baby bonding in the early postpartum period and its association with mental health, longitudinal research of parent-baby bonding that incorporates the father as well as the mother remains sparse.

#### **4.2.2 The couple's relationship**

For fathers as well as mothers, the transition from a dyad to a triad, the so called “birth of a family” (Favez, Frascarolo & Fivaz-Depeursinge, 2006), is a time full of psychologically demanding challenges and changes (Goodman, 2005a; McHale, Kuersten-Hogan & Rao, 2004). The capacity to form triadic relationships is crucial for a successful parenthood (Perren et al., 2003). Family system perspectives have long acknowledged the important role of the inter-parental relationship in influencing the parent-child relationships and vice versa (Barnett, Deng, Mills-Koonce, Willoughby & Cox, 2008; Bell et al., 2007; Boyce, Condon, Barton & Corkindale, 2007; Cowan & Cowan, 2000; Erel & Burman, 1995; Fivaz-Depeursinge, Favez, Lavanchy, De Noni & Frascarolo, 2005). Poor relationship quality within the couple may also contribute towards the development of mental health problems (Simpson, Rholes, Campbell, Tran & Wilson, 2003) or alternatively be a consequence of mental health problems (Milgrom & McCloud, 1996). Prospective studies are needed to understand these associations more fully.

#### **4.2.3 Baby characteristics**

The temperament of the baby is another potential influence on the parent-baby relationship quality and attachment (e.g., Belsky, 1984; Goldsmith & Alansky, 1987). Baby characteristics including excessive crying, sleeping difficulties and over sensitivity to stimulation are hypothesised to affect the mother-baby relationship negatively (Hofacker & Papousek, 1998; Zhu et al., 2007). Difficult infant temperament is commonly reported by parents suffering from depression (e.g., Bang, 2011; Britten,

2011; Hanington, Ramchandani & Stein, 2010). However, some argue that this association may be due to negative parental perceptions rather than a true objective judgement of the child's character (Milgrom, Westley & McCloud, 1995; Pauli-Pott, Mertesacker, Bade, Haverkock & Beckmann, 2003). For example, negative cognitive bias in parents with psychological problems may lead to negative perceptions of their child's temperament (Jones, McFall, & Diego, 2004; McMahon, Barnett, Kowalenko, Tennant, & Don, 2001). Also, findings show that these negative perceptions are associated with later behavioural problems in the child and remain even after effective treatment of depressive symptoms (Forman et al., 2007). Davies, Slade, Wright and Stewart (2008) similarly found that mothers with PTSD following childbirth perceived their baby's temperament as more difficult, accompanied by more negative maternal representations and a less optimal attachment relationship. Similar to other areas of research, studies have focused on mothers only, with limited research into the association between father's mental health and perceptions of their infant's temperament, and the parent-baby relationship.

#### **4.2.4 The present study**

In summary, Belsky's model of parenting (1984) and supporting empirical evidence suggest that mental health problems in the transition to parenthood may have negative effects on the parent-baby relationship. Poor quality of the couple's relationship and a difficult infant temperament may also negatively influence this relationship. However, there are a few gaps in the literature. Firstly, prospective, longitudinal studies beyond the first postpartum year are sparse regarding the associations between parental mental health, the couple's relationship, infant's temperament and the parent-baby relationship. Secondly, research regarding the adverse consequences of parental mental health on the parent-baby relationship has mainly been



limited to depression and using samples of mothers. This needs to be extended to include other mental health conditions (e.g., PTSD and anxiety) and also include fathers, to compare any differential effects from these mental health conditions and any gender differences.

The main aim with this prospective longitudinal study was to explore the associations between and effect of parental mental health (PTSD, depression and anxiety), the couple's relationship quality, infant temperament on the parent-baby bond in both mothers and fathers, concurrently and across time. On the basis of the research reported above, the following hypotheses were made: (1) A low quality of the parent-baby bond will be associated with high levels of mental health symptoms and infant difficulty and low levels of the couple's relationship quality. (2) Mental health symptoms will be associated with each other concurrently and across time, with women experiencing higher levels of mental health symptoms than men.

### **4.3 Method**

#### **4.3.1 Participants**

Couples were recruited to the Sussex Journey to Parenthood Study (UK). They were eligible to take part if the women were expecting their first baby, were in a relationship with the co-parent, were fluent in English, over 18 years and gestation was over 30 weeks. Exclusion criteria were if either member of the couple was currently being treated for a psychiatric disorder and if the baby had died before or after birth.

In total 141 people took part in the study (75 women and 66 men). The response rates at different time points were 90%, 77% and 70%. Comparison of participants who completed one or two time points with participants who completed all time-points found no difference on demographic or other study variables, with the

exception that participants who did not complete all time-points were more likely to be of a non-white European origin ( $\chi^2(1) = 5.66, p = .02$ ). At the time of recruitment, women were aged between 22 and 46 years ( $M = 33.04, SD = 5.19$ ) and men were aged between 26 and 44 years ( $M = 34.08, SD = 4.59$ ). Their average length of the couple's relationship was 73 months for women ( $SD = 46.49$ ) and 76 months ( $SD = 56.89$ ) for men.

#### **4.3.2 Design and Procedure**

This was a prospective study of the transition to parenthood in first time parents, which examined the effects of psychological symptoms (PTSD, depression and anxiety), couple relationship quality and infant characteristics on the quality of the parent-baby bond. Questionnaire measures were collected at three time-points: Time 1 (T1) in late pregnancy (>30 weeks); Time 2 (T2) 3 months postpartum; and Time 3 (T3) 15 months postpartum.

Ethical approval was obtained from the NHS Research Ethics Committee (Appendix C) and the University Research Governance Committee. Expectant, eligible parents were recruited in late pregnancy through hospital and community antenatal clinics, NHS antenatal classes, and pregnancy classes. If they agreed to participate, they were given information sheets, consent forms and the first set of questionnaires (T1). These were completed at the time or later at home, and sent back in a prepaid envelope. If the consent forms and questionnaires were not returned within 10 days, they were followed up by telephone, mail or email. Maternity ward registers were checked regularly to find out the date of birth of their babies so that the second set of questionnaires (T2) could be posted, approximately 3 months after birth. Fifteen months after the birth, the final set of questionnaires (T3) were sent out together with an information letter and a short newsletter to all parents who had completed

questionnaires at either or both of the earlier time-points (T1 and T2). Similarly, participants were contacted within three weeks, if questionnaires were not returned. The babies were approximately 12 weeks old at time 2 ( $M = 11.70$  weeks,  $SD = 3.04$ ) and 15 months old at time 3 ( $M = 14.56$  months,  $SD = 2.13$ ).

#### 4.3.3 Measures

Measures taken in pregnancy and after birth included affective symptoms (*The Hospital Anxiety and Depression Scale, HADS*, Zigmond & Snaith, 1983; Appendix F) and the couples' relationship (*The Dyadic Adjustment Scale, DAS*, Spanier, 1976; Appendix I). The HADS measures presence or absence of symptoms of anxiety and depression and consist of 14 items rated on a continuous 4- point scale. The total scale ranged from 0 -42, with high scores indicating more pathological responses. It has been used widely in non-obstetric populations with well-established reliability and validity (Ayers, 2001). This study found good alpha reliabilities of  $\alpha$  for the total scale at all three time-points (.77, .87, .84). The DAS was completed at T1 and T3 and measures the quality of the couple's relationship and total scores range from 0 – 151, with higher scores corresponding to a better relationship. Previous studies (Spanier, 1976) have demonstrated high internal consistency for the total scale (Cronbach Alpha, .96) and satisfactory content, criterion and construct validity. The current study's Cronbach Alpha statistics were satisfactory at both time 1 (.89) and time 3 (.94).

Postpartum measures included PTSD (*The Posttraumatic Stress Diagnostic Scale, PDS*, Foa, Cashman, Jaycox & Perry, 1997), infant characteristics (ICQ) and the parent-baby bond (PBQ). The PDS consists of 17 items that correspond to DSM-IV criteria for a diagnosis of PTSD (5 intrusion, 7 avoidance and 5 arousal items) and has previously been used to assess posttraumatic stress symptoms in relation to childbirth (e.g., Parfitt & Ayers, 2009; Sawyer & Ayers, 2009). Total scores range from 0 – 51,

with higher scores indicating a greater symptom severity. Internal consistency was good at both time points ( $\alpha = .87$ ).

*The Infant Characteristic Questionnaire, ICQ*, (Rothbart, 1981; Appendix H) measures parents' perception of their baby's temperament. Total scores range from 24 to 168 and higher scores indicate a more difficult temperament. Internal consistency was good at both time points ( $\alpha = .84$  at T2 and  $.86$  at T3).

*The Postpartum Bonding Questionnaire, PBQ*, (Brockington et al., 2001; Brockington, Fraser & Wilson, 2006; Appendix G) measures the quality of the parent-baby bond. It consists of 25 items, rated on a 6-point Likert scale, with total scores ranging from 0 to 125, where high scores indicate a poorer parent-baby bond. It has the following subscales: Scale 1, *Impaired Bonding* (12 items, range of 0 – 60); Scale 2, *Rejection and Anger* (7 items, range of 0 – 35); Scale 3, *Infant focused Anxiety* (4 items, range 0 – 20) and Scale 4, *Incipient Abuse* (2 items, range 0 – 10). The Cronbach Alpha reliability for the total scale at T2 was  $.85$  and for T3,  $.84$ .

#### **4.3.4 Statistical analysis**

Data screening revealed that some variables were significantly skewed. Therefore, nonparametric tests were used where possible. Where parametric tests were necessary (see below) analyses were performed on the raw and transformed data (log transformation). However, the pattern of results did not differ so analyses on the raw data are presented, as they are conceptually more meaningful (Tabachnick & Fidell, 2007).

The associations between the continuous main variables were examined using statistical Spearman's ( $\rho$ ) rank order correlation test. Mean differences between gender and time-points were compared using repeated ANOVAs. The relationships between psychological, social and infant temperament variables on the quality of

parent-baby bond at both postpartum time points were examined in hierarchical multiple regression analyses separately for men and women. Examination of residuals showed that the assumptions of multiple regressions regarding multicollinearity, homoscedasticity, independence and normally distributed errors were met.

#### **4.4 Results**

The results are reported in two main sections. The first section presents the sample characteristics and descriptive statistics of the main variables. This section also presents prospective, longitudinal differences of these variables and gender comparisons. The second section corresponds to the main aim of the study which is to explore the effect of parental mental health, the couple's relationship quality and infant temperament on the quality of the parent-baby bond.

##### **4.4.1 Sample characteristics and comparisons of symptoms across time and gender**

The majority of participants were of white European origin (86%) and were married or cohabitating (98.5%). A high proportion of the sample (86%) had completed a higher education or professional qualification. The sample had high rates of assisted delivery (21%) and planned or emergency caesarean sections (40%). Descriptive statistics with means and standard deviations for the main measures over time are presented in Table 4.1. It can be seen that there is a significant change over time for anxiety symptoms and total symptoms of anxiety and depression, which are higher in pregnancy and 15 months postpartum, compared to after birth, indicating greater levels of psychological distress in pregnancy and later postpartum. Additionally, post-hoc tests revealed that both the combined measure of anxiety and depression symptoms as well as anxiety symptoms alone were significantly higher in pregnancy compared to three months postpartum, but with no other significant differences found between time points.

Other symptoms of psychopathology (PTSD and depression alone) did not significantly change over time.

In addition, significant changes can be seen over time in the couple's relationship. The means for the total dyadic adjustment scale indicate that the couple's relationship was significantly worse 15 months postpartum compared to in pregnancy, both for men and women. Table 4.1 also shows that parents perceive their baby's temperament (ICQ) as significantly more difficult in early postpartum compared to later postpartum. The decrease in means for the total postpartum bonding scale further suggests that the parents' bonding to their baby generally improved over time.

Gender differences were mainly found with regards to mental health variables, with women reporting significantly more overall symptoms of PTSD. The means of women's depression symptoms and for the total hospital depression and anxiety scale were also significantly higher than for the men. No significant gender differences were found for the other variables.

Within couple concordance patterns were also examined concurrently and across time using Spearman's (*rho*) rank correlation tests. These showed that mental health symptoms within the couples were not significantly associated at any time point. However, the couples' relationship and also their reports of their baby's temperament were significantly associated within couples at all time-points ( $r$  range = .33 to .66). The couple concordance of parent-baby bonding was also significant at three months postpartum ( $r = .51$ ).

#### **4.4.2 Associations between variables**

Correlations between the main study variables are summarised in Table 4.2, separately for men and women. It can be seen that the anxiety, depression and PTSD symptoms are significantly associated with each other at all time-points. Additionally

the majority of mental health variables are significantly associated with the parent-baby bond at both 3 months and 15 months postpartum.

The parent-baby bond shows significant correlations with a great majority of the other main study variables at both postpartum time-points, especially for men. The significant associations are all in the predicted direction, with higher levels of mental health symptoms, lower quality of the couple's relationship and more difficult infant temperament being significantly associated with poorer quality of parent-baby bonding.

**Table 4.1 Repeated ANOVA of main study variables**

	<b>Pregnancy (T1)</b>		<b>3 months postpartum (T2)</b>		<b>15 months postpartum (T3)</b>		<b>Time</b>	<b>Gender</b>
	Mean (SD)		Mean (SD)		Mean (SD)			
	Women	Men	Women	Men	Women	Men	F(df)	F(df)
<b>PTSD symptoms</b>	-	-	5.41 (6.55)	2.72 (2.55)	5.18 (5.72)	3.75 (6.02)	0.41 (1, 83 )	3.87 <sup>+</sup> (1, 83)
<b>Total affective symptoms</b>	11.84 (5.15)	9.50 (5.45)	10.00 (6.48)	7.68 (5.81)	10.46 (5.82)	9.10 (6.02)	4.17* (2,148) <sup>a</sup>	3.12 <sup>+</sup> (2, 148)
Anxiety	6. 70 (2.56)	6.28 (3.50)	5.77 (4.24)	4.44 (3.35)	6.09 (3.24)	4.95 (3.42)	6.16**(2,148) <sup>b</sup>	2.26 (2, 148)
Depression	5.14 (3.30)	3.22 (2.65)	4.23 (2.80)	3.24 (2.99)	4.36 (3.31)	4.15 (3.52)	1.15 (2, 148)	3.19 <sup>+</sup> (2, 148)
<b>Relationship total</b>	117.93 (15.38)	119.23 (11.39)	-	-	111.68(18.45)	113.34 (18.23)	18.98*** (1,85)	0.20(1, 85)
<b>Infant temperament</b>	-	-	69.22 (13.37)	70.82 (13.68)	64.19 (12.71)	64.99 (13.59)	14.30*** (1,80)	0.21 (1, 80)
<b>Parent-baby bond total</b>	-	-	11.49 (7.88)	13.08 (10.93)	11.18 (7.05)	13.00 (8.83)	0.07(1, 81)	0.94 (1, 81)
PBQ Impaired bonding	-	-	6.11 (4.11)	6.66 (5.55)	5.97 (3.87)	6.40 (4.39)	0.24 (1, 81)	0.30(1, 81)
PBQ Rejection & Anger	-	-	2.46 (2.94)	3.12 (3.34)	2.81 (2.65)	3.26 (2.92)	0.79 (1, 81)	0.89 (1, 81)
PBQ Anxiety	-	-	2.90 (1.86)	2.88 (1.73)	2.30 (1.61)	2.89 (2.25)	1.59(1, 80)	0.67(1, 80)
PBQ Incipient Abuse	-	-	0.08 (.28)	0.44 (1.76)	0.06 (.32)	0.47 (1.19)	0.01 (1, 79)	3.28 (1, 79)

*Note:* . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . For one tailed: <sup>+</sup> $p < .05$ . <sup>++</sup> $p < .01$ . <sup>+++</sup> $p < .001$ . Number of women ranged from 44 to 52 and men from 32 to 37.

Post-hoc tests revealed significant time differences between pregnancy and 3 months postpartum, <sup>a</sup>  $t(90) = 3.91, p < .001$ , <sup>b</sup>  $t(90) = 4.25, p < .001$ .



**Table 4.2 Correlations between main study variables.**

Men (upper triangle) and women (lower triangle)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Parent baby bond (T2)		.76**	.05	.55**	.27	.48**	.30	-.21	-.28*	.59**	.47**
2. Parent baby bond (T3)	.61**		-.02	.37*	.61**	.39*	.49**	-.46*	-.57**	.46**	.58**
3. Anxiety & Depression (T1)	.49**	-.01		.49**	.33**	.46**	.23	-.22	-.16	.01	-.03
4. Anxiety & Depression (T2)	.37**	.11	.57**		.46**	.64**	.49**	.03	-.09	.43**	.34*
5. Anxiety & Depression (T3)	.21	.32*	.41**	.65**		.44**	.65**	-.32	-.57**	.16	.34*
6. PTSD (T2)	.20	.27	.47**	.63**	.42**		.33*	.04	-.11	.37*	.39*
7. PTSD (T3)	.23	.28*	.28*	.53**	.64**	.51**		-.14	-.50**	.21	.25
8. Couple's relationship (T1)	-.41**	-.25	-.28*	-.12	-.23	-.06	-.10		.77**	.05	-.13
9. Couple's relationship (T3)	-.32*	-.34**	-.31*	-.17	-.45**	-.17	-.48**	.66**		-.14	-.41**
10. Infant temperament (T2)	.26	.17	.03	.21	-.09	.18	.15	-.02	-.18		.65**
11. Infant temperament (T3)	.15	.59**	.01	.04	.24	.18	.30*	-.04	-.34**	.39**	

*Note:* T1 = time 1, late pregnancy; T2= time 2, 3 months postpartum; T3 = time 3, 15 months postpartum. Number of women ranged from 48 to 68 and men from 34 to 57.

#### 4.4.3 Multivariate predictors of the parent-baby bond

Four hierarchical multiple regression analyses were conducted to examine the contribution of parental mental health, the couple's relationship and infant temperament variables on the parent-baby bond both 3 months postpartum and 15 months postpartum, separately for women and men. Predictor variables which had medium sized bivariate relationships  $\geq .2$  (Cohen, 1992) with these outcome measures were entered into the model.

The first two models looked at the parent-baby bond 3 months postpartum (T2). Pregnancy variables were entered in step 1, followed by T2 mental health variables and finally the infant temperament measure at T2. The next two models looked at the parent-baby bond 15 months postpartum (T3). Pregnancy variables were entered into the first step, followed by T2 variables in the second step; and finally in the last three steps, T3 variables with mental health first, followed by the couple's relationship and infant temperament measures.

Results of the first analyses predicting the parent-baby bond at 3 months postpartum are shown in Tables 4.3 and 4.4. It shows that each step of predictors significantly increased the proportion of variance accounted for in the parent-baby bond, both for men and women, with the exception of step 1 for men. For women, 53 % of the variance for the mother- baby bond 3 months postpartum was explained by the predictors,  $F(5,43) = 9.72, p < .001$ . Significant individual predictors were the couple's dyadic relationship in pregnancy and concurrent measures of the infant's temperament. For men, 39% of the variance was accounted for by the predictors,  $F(4, 34) = 5.33, p < .002$ , with significant predictors being the same as for women.

**Table 4.3 Hierarchical regression analyses predicting parent-baby bond quality 3 months postpartum, women only.**

Women				
Predictor	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$
Step 1				.30***
Affective symptoms in pregnancy	0.07	0.26	.04	
Couples relationship in pregnancy	-0.21	0.06	-.38**	
Step 2				.09*
PTSD symptoms (3 months)	0.22	0.18	.19	
Affective symptoms (3 months)	0.32	0.21	.26	
Step 3				.14***
Infant temperament (3 months)	0.23	0.06	.38***	
Total $R^2$				.53***
<i>F</i>				9.72

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .  $n = 49$ .

**Table 4.4 Hierarchical regression analyses predicting parent-baby bond quality 3 months postpartum, men only.**

Men				
Predictor	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$
Step 1				.07
Couples relationship in pregnancy	-0.36	0.14	-.35*	
Step 2				.21**
PTSD symptoms (3 months)	-0.14	0.81	-.03	
Affective symptoms(3 months)	0.60	0.36	.33	
Step 3				.11*
Infant temperament (3 months)	0.27	0.11	.37*	
Total $R^2$				.39**
<i>F</i>				5.33

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .  $n = 39$ .

Results for the next two analyses predicting the parent-baby bond 15 months postpartum are presented in Tables 4.5 and 4.6. These analyses showed that for women, the predictors explained 55% of the variance ( $F(7, 36) = 13.70, p < .001$ ) and for men 86% of the variance of the final model ( $F(9, 17) = 11.57, p < .001$ ). For women, the mother-baby bond at 3 months and the infant's temperament at 15 months postpartum added a unique significant contribution to the mother-baby bond at 15 months postpartum. For men, affective symptoms at 3 months and 15 months postpartum and their pregnancy and concurrent relationship with their partner were significant predictors, even after accounting for the early father-baby bond. However, net suppressor effects (Howell, 2009) were observed for affective symptoms at 3 months and the couple's concurrent relationship. Therefore, overall, these results suggest that apart from the early father-baby bond, the most important predictors for the father-baby bond at 15 months were concurrent affective symptoms and their relationship with their partner in pregnancy. However, caution should be taken as the suppressor variables may enhance the importance of other variables.

**Table 4.5 Hierarchical regression analyses predicting parent-baby bond quality 15 months postpartum, women only.**

Women				
Predictor	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$
Step 1				.07
Couples relationship in pregnancy	-0.07	0.07	-.15	
Step 2				.50***
Parent-baby bond (3 months)	0.52	0.11	.57***	
Step 3				.00
PTSD symptoms (3 months)	-0.10	0.13	-.09	
Step 4				.02
PTSD symptoms (15 months)	0.13	0.20	.10	
Affective symptoms(15 months)	0.17	0.17	.14	
Step 5				.00
Couples relationship (15 months)	0.10	0.06	.25	
Step 6				.14***
Infant temperament (15 months)	0.24	0.06	0.43***	
Total $R^2$				.73***
<i>F</i>				13.70***

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .  $n = 44$ .

**Table 4.6 Hierarchical regression analyses predicting parent-baby bond quality 15 months postpartum, men only.**

Men				
Predictor	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$
Step 1				.13
Couples relationship in pregnancy	-0.25	0.11	-.36*	
Step 2				.51***
Parent-baby bond (3 months)	0.57	0.10	.82***	
Step 3				.06
PTSD symptoms (3 months)	0.59	0.48	.20	
Affective symptoms (3 months)	-0.49	0.20	-.39*	
Infant temperament (3 months)	0.07	0.09	.14	
Step 4				.11**
PTSD symptoms (15 months)	0.17	0.20	.13	
Affective symptoms (15 months)	0.67	0.20	.50*	
Step 5				.04*
Couples relationship (15 months)	0.22	0.10	.50*	
Step 6				.01
Infant temperament (15 months)	0.07	0.09	.12	
Total $R^2$				.86***
<i>F</i>				11.57***

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .  $n = 27$ . Caution should be taken as the ratio of participants to predictor variables is low.

## **4.5 Discussion**

This study prospectively explored how mental health, the couple's relationship and infant characteristics are related to the parent-baby bond during the transition to parenthood for both parents. The results support Belsky's model of parenting in that the parent-baby bond was associated with the couple's relationship, parents' mental health and infant characteristics. Regression analyses suggest that the couple's pregnancy relationship and the infant's concurrent temperament are the most important predictors for the parent-baby bond at three months postpartum for both men and women, with concurrent infant characteristics also being significant at 15 months for women. However, men's concurrent affective symptoms and pregnancy partner relationship appeared more important to their bond with their baby at this later stage, over and above the early father-baby bond. Few overall gender differences were observed for individual study variables means, with the exception that women on average reported more symptoms of psychological distress than men. Instead, many similarities within couples were found, with regards to relationship and infant temperament factors. Across time comparisons indicated that anxiety symptoms peaked in pregnancy whilst the couple's relationship declined with time and measures of the infant temperament and the parent-baby bond improved with time.

### **4.5.1 Comparisons of symptoms across time and gender**

The results suggested that symptoms of anxiety significantly changed with time, with higher levels of psychological distress in pregnancy and later postpartum compared to three months postpartum, whereas no significant differences across time occurred for depression or postpartum PTSD symptoms. The former finding highlights the need to be help parents cope with anxiety already in pregnancy, and is broadly consistent with previous research regarding higher prevalence of anxiety in pregnancy, both in women



(e.g., Andersson, Sundstrom-Poromaa, Wulff, Astrom & Bixo, 2006; Bretkopf et al., 2006; Heron et al., 2004) and men (e.g., Buist et al., 2003; Condon, Boyce, Corkindale, 2004). However, recently researchers (Matthey & Ross-Hamid, 2011) have raised the issue of whether psychopathology in pregnancy may be overestimated, as physical and psychological reported changes should be considered normal rather than viewed as pathological.

The latter finding regarding relatively stable levels of PTSD and depression symptoms across time shows the potential chronicity of these conditions, a similar finding to that of White et al.'s study (2006). This also points to the need of early psychological intervention, to avoid persistence of symptoms. Furthermore, in line with the prediction, the majority of mental health variables were significantly correlated with each other at all time-points, indicating a high co-morbidity of depression, anxiety and PTSD, an already well-established finding with regards to childbirth related psychological symptoms (e.g., White et al., 2006; Parfitt & Ayers, 2009).

Whilst the couple's relationship got significantly worse over the transition to parenthood, the ratings of parent-baby bond and infant temperament improved with time. The decline in the couple's relationship is in line with other transition to parenthood literature (e.g., for a review see Bateman & Bharj, 2009). Similarly to the current study, Muzik et al. (2013) found a general increase in the mother-infant bonding quality over the first 6 months postpartum irrespective of risk status (e.g., mental health problem), but longitudinal research of the trajectory of both parents' bonding with their baby past this early period remains sparse. The improvement of parental reports of the infant's temperament may be explained by the attachment and bonding process itself, where the parent and baby develop their relationship and joint meanings (intersubjectivity) through reciprocal interactions over time, with the parents learning to

interpret their baby's intentions and behaviours, which help the baby to regulate his/her emotions (Arnott & Meins, 2007; Trevarthen & Aitken, 2001). Additionally, previous studies generally show that the parental perceptions of their infants' temperament remain relatively stable across time (Lee & Bates, 1985) and also predict later child temperament (Canals, Hernandez-Martinez, Fernandez-Ballart, 2011).

Gender comparisons revealed that as predicted and in line with previous studies (Goodman, 2004; Ramchandani et al., 2005), on average, women suffered from worse mental health than men, with significantly higher levels of PTSD and depressive symptoms. In contrast to Iles et al.'s study (2011), none of the psychological symptoms in the present study were significantly related within couples. The lack of couple concordance needs to be investigated further, as there were methodological differences in type and timing of measures between these two studies. However, the couple's relationship and reports of the infant characteristics (at both three and 15 months postpartum) and the parent-baby bond at 15 months were significantly associated within couples. This would be expected as the couple share the joint parenting experience and relate to the same baby through triadic interactions (Fivaz- Depeursinge et al., 2005). Co-parenting research acknowledge, for example, that parents either support or undermine each other's parenting (Davis, Schoppe-Sullivan, Mangelsdorf & Brown, 2009) with contagion of both positive and negative interactions between parents (Barnett et al., 2008; Ryan, Martin & Brooks-Gunn, 2006).

#### **4.5.2 Factors associated with the parent-baby bond**

Whilst many medium sized or large bivariate associations were found between parental mental health and the parent-baby bond, multivariate analyses suggested the most important determinants of both the mother-baby and father-baby bond at three months postpartum, were the couples' relationship during pregnancy and concurrent

infant temperament. At 15 months postpartum, some gender specific patterns emerged. For men, their concurrent affective symptoms, and their relationship with their partner in pregnancy affected the father-baby bond over and above their bond with the baby at 3 months postpartum. For women, concurrent infant characteristics significantly predicted the mother-baby bond at 15 months postpartum, over and beyond their earlier mother-baby bond.

The finding that a difficult infant temperament is associated with a less optimal parent-baby relationship has been acknowledged in previous research (Mantymaa et al., 2006; Murray, Stanley et al., 1996). Parental perceptions of their infant's characteristics have also been associated with the child's development (Hernandez-Martinez, Canals Sans, Fernandez-Ballart, 2011; Molfese et al., 2010) and parental mental health (e.g., Hanington et al., 2010; Mantymaa et al., 2006; McGrath, Records & Rice, 2008). The greater contribution of the baby's concurrent temperament on the mother-baby bond compared to the father-baby bond at 15 months postpartum may tentatively be explained by the fact that usually mothers spend more time with the baby during the first year and that they may therefore evaluate their bonding with their baby and general motherhood ability in terms of their baby's temperament, i.e. feeling good about their relationship if they baby is "easy" and vice versa. Clinically, targeting mothers' early negative perceptions of their baby may be of special importance as this has been linked to later child behavioural problems (e.g., Forman et al., 2007).

The importance of the couple's relationship in pregnancy was also emphasised by the results of this study, and supports research which suggests that the parent- baby relationship can be predicted already in pregnancy, by the interactions of the couple (Favez et al., 2006; Florsheim & Smith, 2005). This also suggests a causal direction with the couple's relationship influencing the parent-baby relationship, rather than the

other way around. An explanation of the crucial importance of the pregnancy relationship may be that this measure is representative of the parents fundamental underlying internal mental representations of attachment relationships in general (e.g., Isles et al., 2011; Mantymaa et al., 2006), and as such may have a greater influence on the parent's ability to bond with their baby both short-term and long-term, compared to later measures.

The findings that men's affective symptoms predicted the father-baby bond at 15 months postpartum supports current research of the associations between fathers' mental health and the father-infant relationship (e.g., for a review see Wilson & Durbin, 2010). It also emphasises the importance of attending to men's psychological well-being in the "transition to parenthood period". The lack of a significant contribution of individual mental health symptoms on the parent-baby bond at three months postpartum may be explained by the symptom overlap between anxiety, depression and PTSD, as their combined but not their individual contribution significantly predicted the parent-baby bond at three months, both for women and men. However, despite the difficulties in separating the individual contribution of differing psychological symptoms, it may be enough for clinicians to be aware of possible bonding problems when a parent suffers from any of those psychological disorders and be especially alerted to the increased risk in parents suffering from co-morbidity (Parfitt & Ayers, 2009).

#### **4.5.3 Methodological issues and future directions**

Strengths of the current study include the prospective longitudinal design, which enabled comparisons across time between the mental health and relationship measures and also allowed for measurements of baseline symptoms in pregnancy. Secondly, the inclusion of men permitted some gender comparisons. This is an important contribution, as prospective and longitudinal research looking at psychopathology and the parent-

baby relationship in both men and women is limited. Additionally, the effects of PTSD on the parent-baby relationship have not been widely studied. However, a few limitations need to be taken into account when interpreting the results, namely that the sample is relatively small and consists of predominantly white European and highly educated parents. The sample size meant the study was only powered to identify medium or large effects and analyses had to be restricted to the main variables only, rather than examining subscales. This limitation was especially apparent in the regression analyses for men at 15 months postpartum, as the number of participants to the number of predictor variables in the model was low. Attrition rates between the time points additionally reduced the sample size, especially when comparing across time-points. Caution should also be taken regarding the interdependency of scores between the partners in the same couple. Future research should therefore be carried out with larger, more representative samples to enable the application of more complex analyses (e.g., structural equation modelling, SEM) of variables, and would benefit from treating the family as a unit of analysis, and not each parent.

#### **4.5.4 Conclusions and implications**

The findings from this exploratory study of mothers' and fathers' transition to parenthood indicate that parental perceptions of their infant's temperament and the partner relationship in pregnancy are important predictors of the parent-baby bond at three months and 15 months postpartum. This highlights the importance of interventions targeting the couple's relationship and helping parents to perceive their baby's temperament positively as early as possible, to prevent negative long-term interactive patterns from forming. The significant impact of men's concurrent affective symptoms on their bond with their baby at 15 months postpartum further emphasises the importance of enhancing fathers' mental well-being in their transition to parenthood.

Future studies would also benefit from exploring the parent-baby bonding process and interactions between parental, baby and contextual factors further, prospectively across time, in larger samples of mothers and fathers.

## **5 The Impact of Parents' Mental Health on Parent-Infant Interaction: A Prospective Study (Article 4)**

Parfitt, Y., Pike, A. & Ayers, S. (2013). The impact of parents' mental health on parent-baby interaction: A prospective study. *Infant Behavior and Development*, 36, 599 – 608.

### **5.1 Abstract**

The aims of the current study were to examine the effect of fathers' and mothers' pre and postnatal mental health on mother-infant and father-infant interactions. Mental health was broadly defined to include anxiety, depression and PTSD. A community sample of 44 mothers and 40 fathers from 45 families completed questionnaire measures of mental health in late pregnancy and three months postpartum. Mother-infant and father-infant interactions were observed and videoed three months postpartum and analysed using the CARE-index. Results showed that prenatal mental health, in particular anxiety, was associated with parent-infant interactions to a greater extent than postnatal mental health. Fathers' prenatal symptoms were associated with higher paternal unresponsiveness and infant passivity whilst fathers' postnatal symptoms were associated with higher levels of infant difficulty in the father-baby interaction. The results also indicated that mothers and fathers interaction with their babies were similar, both on average and within the couples, with 27% being inept or at risk. These findings highlight the need for early detection and prevention of both mental health and parent-infant relationship problems in fathers as well as mothers. However, further prospective and longitudinal studies are needed to understand the influences of parental mental health on the parent-infant interactions further. Also it should be noted that the mental health scores were low in this sample, which may reflect the sample characteristics. Future studies therefore would benefit from focusing on more vulnerable groups of parents.

## **5.2 Introduction**

The quality of the early dyadic interaction between the primary caregiver and baby is important for the child's socio-emotional, cognitive, language and brain development (Hay & Pawlby, 2003; Murray, Fiori-Cowley, Hooper & Cooper, 1996; Trevarthen & Aitken, 2001), for the formation of secure attachment (Steadman et al., 2007; Crittenden, 1995; Tomlinson, Cooper & Murray, 2005) and the child's future mental health (Skovgaard et al., 2008). A failure to establish a satisfactory early parent-baby relationship may also put the baby at risk of child abuse and neglect (Scannapieco & Connell-Carrick, 2005). It is therefore important to understand early risk factors for an unsatisfactory parent-infant relationship. One such risk factor is poor parental mental health. The current study aims to extend previous research by using direct observations to explore both mothers and fathers interactions with their baby in relation to their mental health. Mental health was broadly defined to include anxiety, depression and PTSD measures

### **5.2.1 Parent-infant interactions**

Although the family systems perspective acknowledges the importance of fathers' impact on their baby and the family as a whole (e.g., Bell et al., 2007; Cowan & Cowen, 2002; Erel & Burman, 1995; Fivaz-Depeursinge, Favez, Lavanchy, De Noni & Frascarolo, 2005), there is still far less research on fathers than mothers, with inconclusive findings. There are indications that fathers may experience more difficulties with their emotional relationship and interactions with their baby than mothers (Edhborg, Matthiesen, Lundh and Widstrom, 2005). Whilst some studies show an interdependence of negative intrusive interactive patterns across the mother-infant and father-infant dyads (Barnett, Deng, Mills-Koonce, Willoughby & Cox, 2008) as well as maternal and paternal positive, supportive parenting patterns resembling each



other (Martin, Ryan & Brooks-Gunn, 2007), other researchers have not found any significant associations between observed mother-infant and father-infant interactions (Goodman, 2008).

### **5.2.2 Parental mental health and parent-infant interactions**

One of the major parental risk factors for a negative parent-baby relationship, with increased risks for child maltreatment, is parental mental illness (Brockington, 2004; Hindley, Ramchandani & Jones, 2006; Pawlby, Hay, Sharp, Waters & Pariante, 2011; Scannapieco & Connell-Carrick, 2005). Specifically maternal depression has been linked to poor quality of mother-baby interaction (for a review, see Field, 2010). For example, Beck (1995) found a moderate to large effect of postpartum depression on maternal-infant interaction. Similarly Kemppinen, Kumpulainen, Moilanen and Ebeling (2006) found that 75% of mothers who were identified as being “at risk” in lack of sensitivity towards their infant 6 to 8 weeks postpartum, also reported depressive symptoms. Evidence shows that depressed mothers are less sensitive towards their babies (Murray, Fiori-Cowley et al., 1996; Steadman et al., 2007), being more intrusive or withdrawn (Black et al., 2007; Field, Hernandez-Reif & Diego, 2006; Herrera, Reissland & Shephard, 2004;) and less accurate in interpreting their baby’s emotions (Broth, Goodman, Hall & Raynor, 2004). Similarly paternal depression has been associated with a less optimal father–infant relationship (Field, Hossain & Malphurs, 1999; Field, 2010; for a review, see Wilson & Durbin, 2010) with examples of less involvement with their child (Roggman, Boyce, Cook & Cook, 2002). Also, maternal depression has been shown to indirectly influence the father-infant interaction negatively (Bradley & Slade, 2011; Goodman, 2008). Comparable effects of maternal and paternal depression on parenting behaviours have been found (e.g., Cummings, Keller & Davies, 2005; Leinonen, Solantaus & Punamaki, 2003). However, few

observational studies have looked at father-infant interactions in relation to paternal and maternal pre and postnatal mental health, as previous studies have mainly relied on maternal postpartum self-report or interview measures and concern older children.

Interestingly, different types of parental psychopathology and/or adversity may give rise to different dyadic interactional patterns. For example, Cassidy, Zoccolillo and Hughes (1996) found that severity of depression amongst adolescent mothers correlated with maternal control and infant difficulty, whilst mothers with severe antisocial histories showed unresponsiveness and their infants had higher levels of passivity. There is also evidence of negative effects of anxiety on the parent-baby relationship and child outcomes (Feldman et al., 2009; Glasheen, Richardson & Fabio, 2010, for a review). Finally, studies also suggest that PTSD following childbirth may be linked to problems in the parent-baby relationship (Ballard, Stanley & Brockington, 1995; Nicholls & Ayers, 2007; Parfitt & Ayers, 2009). However, we are aware of only three observational studies of mother-baby interaction that include PTSD measures, two in the context of premature birth and very low birth weight infants (Feeley et al., 2011; Forcada-Guex, Borghini, Pierrehumbert, Ansermet & Muller-Nix, 2011) and the third focusing on mothers with a history of childhood maltreatment (Muzik et al., 2013, in press).

The timing of the onset and duration of parental mental health problems may also have differential effects on parent-baby interaction. Flykt, Kanninen, Sinkkonen and Punamaki (2010) found, for example, that prenatal depressive symptoms had a stronger impact on unresponsiveness in the mother-baby interaction than postnatal symptoms. The infant also plays an active part in the dyadic interaction with the parent. Crittenden (1985, 1992) drew attention to the fact that although a parent may initiate poor interactive patterns or maltreatment, the baby behaves and uses coping strategies in

ways that maintains those negative patterns. Therefore, it is crucial that the parent-infant interaction is as much about the behaviour of the infant as that of the parent.

### **5.2.3 The present study**

Research to date has focused on the effects of maternal postnatal depression on mother-baby interactions. The present study addresses several gaps in the existing literature by also including prenatal measures of mental health, postnatal PTSD measures and fathers' mental health measures in the context of both mother-infant and father-infant interactions. A preliminary aim of the current study was to explore mean-level differences between mother-infant and father-infant interactions, as well as to assess the degree of similarity of mother and fathers within families. The main aim was to examine contributions of both mothers' and fathers' pre and postnatal mental health to mother-infant and father-infant interaction. It was predicted that high levels of pre- and/or postnatal mental health problems would be associated with less optimal parent-infant interactive patterns.

## **5.3 Method**

### **5.3.1 Participants**

The participants were 44 mothers and 40 fathers from 45 families and were a sub-sample from The Sussex Journey to Parenthood Study (UK), a longitudinal study of the transition to parenthood from pregnancy to the postpartum. Couples were included in the Journey to Parenthood study if they were expecting their first baby, were cohabiting, fluent in English, and over 18 years old. The majority of the participants in the sub-sample (85%) were Caucasian and 97 % had undergone higher education (diploma, undergraduate degree and beyond). At the time of recruitment, the length of the couple's relationship ranged from 12 to 308 months ( $M = 74.02$  months,  $SD =$

49.87) and 64 % were married. Mothers ( $n = 44$ ) were aged between 26 and 43 years ( $M = 33.12$  years,  $SD = 4.79$ ) and fathers ( $n = 40$ ) were aged between 26 and 44 years ( $M = 34.64$ ,  $SD = 5.22$ ). At the time of the observation, the infants (28 girls and 17 boys) were around three months old.

### **5.3.2 Procedure**

Ethical approval was obtained from the NHS Research Ethics Committee (Appendix B) and the University Research Governance Committee. Parents were recruited to the Sussex Journey to Parenthood Study in late pregnancy, mainly through hospital and community antenatal clinics and antenatal classes. Expectant parents who were interested in taking part ( $N = 141$ ) were given information sheets, consent forms and the first set of questionnaires (Time 1), including demographics and measures for anxiety and depression. Questionnaires were completed in pregnancy, at the time or later at home, and sent back in a prepaid envelope. Approximately three months after birth (Time 2), parents were sent a second set of self-report questionnaires (including anxiety, depression and PTSD measures) and also invited to take part in this observational study of a subsample of parents and their infants. Forty-one couples and another five mothers and one father agreed to take part, and a date for a home visit was arranged.

The videotaped interactions were recorded by researchers in participants' homes and were conducted separately with the mother and father. Written informed consent, confidentiality, and the right to withdraw at any time was assured. Before beginning the videotaping, a suitable, light place was chosen, external sounds were reduced and a few age appropriate toys and a baby blanket were supplied. Each parent was asked to "play with your baby as you usually would. You can use toys, or not, as you choose. Sit so you are comfortable and don't worry about the camera". The video recording

commenced once the parent sat down to play and 3 – 5 minutes of the parent-infant play was recorded, with a handheld camcorder. After the interaction, participants were debriefed and were later sent a copy of the video recording. Three of the video recordings were faulty and could therefore not be coded or included in the analysis. The remaining taped interactions were coded by two trained, reliable coders, as recommended by Crittenden (2004), with the coder scoring each adult and infant separately, for each of seven aspects of the interactional behaviour (see below). Each recording was viewed repeatedly, checking for subsets of items, until the coder was satisfied that the scoring reflected the pattern of the interaction. The main coder was blind to all other information regarding the parents and their infants. To check reliability, 12% of video interactions were scored by the first author (YP). The intra class correlation coefficient (ICC) showed a good to excellent agreement, with the ICC (two-way random, absolute agreement, single measure) for parental sensitivity = .82, parental control = .84, parental unresponsiveness = .70, child cooperation = .86, child difficulty = .90, child compulsivity = .92 and child passivity = .85.

### 5.3.3 Measures

**Parent-infant interactions.** The quality of the mother-infant and father-infant interactions was measured using the infant version of the CARE index procedure (Crittenden, 2004) when the babies were three months old. This procedure is based on short 3 to 5 minute videotaped free adult-infant play interactions. It has been validated for use with families from different social classes and cultural backgrounds (Leventhal, Jacobsen, Miller & Quintana, 2004) and shown to discriminate interactional patterns between abusive and non-abusive mothers and their infants (Cassidy et al., 1996). For each parent-infant dyad, seven aspects (facial expression, verbal expression, position, affection, turn-taking, control and choice of activity) were evaluated and contributed to

scores on three adult scales (sensitive, controlling or unresponsive) and four infant scales (cooperative, difficult, compulsive and passive). The operational definitions for these scales are specified in Crittenden's coding manual for CARE index (2004). For each of the seven aspects two points were allocated, either both on one scale or split between two scales, with a total of 14 points, separately for the parent and the infant, thus making the possible range for each scale 0 - 14. Note that the higher the parental sensitivity and infant co-operative scores, the more optimal the interaction. Also, categorical variables were derived, with the parent-infant dyads being classified into highly sensitive (scores 11 – 14); adequately sensitive (scores 7 – 10); ineptly sensitive (scores 5 – 6) and high-risk (scores 0 – 4). Note that the latter two categories are also classified as needing intervention, whilst the first two are classified as "good enough" (Crittenden, 2004).

**Mental Health.** Mental health symptoms were assessed using two self-report scales. The Hospital Anxiety and Depression Scale, HADS (Zigmond & Snaith, 1983; Appendix F) was completed by parents both in late pregnancy and at three months postpartum. This scale measures mental health symptoms and consists of a total of 14 items, seven for depressive symptoms and seven for anxiety symptoms, through statements of presence or absence of symptoms rated on a continuous 4-point scale, with ranges of 0 – 21 for both sub-scales. High scores indicate more pathological responses. This scale has been used widely in non-obstetric populations and has a well-established internal consistency, test-retest reliability and validity (Ayers, 2001). In this study, Cronbachs  $\alpha$  for the pregnancy sub-scales were .77 (anxiety) and .74 (depression) and for the postpartum sub-scales .85 (anxiety) and .74 (depression).

The Posttraumatic Stress Diagnostic Scale, PDS (Foa, Cashman, Jaycox & Perry, 1997) was used to calculate a symptom severity score at three months after birth.

It consists of 17 items (5 intrusion, 7 avoidance and 5 arousal items) and has previously been used in relation to childbirth (e.g., Parfitt & Ayers, 2009; Sawyer & Ayers, 2009). Items are scored on a continuous 4- point scale with a total range of 0 – 51, with higher scores indicating a greater symptom severity. It has been shown to have a high reliability of .92 (Foa et al. 1997). The full PDS scale corresponds to all DSM-IV criteria for the diagnosis of PTSD, and has shown to have an 82% agreement with structured clinical interviews. In the present study, continuous scale scores were used. The internal consistency of  $\alpha$  for these was .87.

#### **5.3.4 Statistical Analysis**

All of the 84 participants who took part in the parent-infant interaction had responded to at least one of the two previous questionnaires (Time 1 in pregnancy or Time 2, three months postpartum). Overall, 64 of those (76%) responded at both stages, with 72 participants completing the Time 1 questionnaire (86%) and 70 (83%) the Time 2 questionnaire. When participants with complete and non-complete data were compared (using  $\chi^2$  and Mann-Whitney), no significant differences were found regarding ethnicity, marital status, gender, education or mental health. Missing data was replaced using the Expectation-Maximization (EM) method for the following reasons. First, it is consistent with the way previous studies have dealt with missing data of multiple assessment points (e.g., Flykt et al, 2010; Conners, Grant, Crone & Whiteside-Mansell, 2006). Additionally, Little's MCAR test was not significant ( $\chi^2 = 44.15, p = \text{ns}$ ), which indicates that the data was missing completely at random and therefore suitable for imputation. Imputation of parental mental health data was therefore performed in order to retain maximal information.

The data screening for normality variables revealed that a few of the mental health variables were significantly skewed according to Kolmogorov-Smirnov (K-S)

test. Therefore associations were examined using Spearman's (*rho*) rank order correlation test. Paired-samples *T*-tests were then carried out to compare mean differences between the mother-infant and father-infant interactional scores.

Hierarchical multiple regression analyses were finally used to examine the impact of pre and postnatal parental mental health variables on the mother-infant and father-infant interaction. The residuals met the necessary assumptions for multiple regressions regarding homoscedasticity and multicollinearity and the errors were independent and normally distributed.

## 5.4 Results

### 5.4.1 Mother- infant and father-infant interactions

Table 5.1 shows the means and standard deviations of mother-infant and father-infant interaction scores. Table 5.2, shows that out of the 44 mothers, 9 (20.5%) were categorised as being “sensitive” to their baby, 20 (45.5%) as “adequate”, 11 (25%) as “inept” and 4 (9.1%) “at risk”. Amongst the 40 fathers, 7 (17.5%) fell within the “sensitive” category, whilst 25 (62.5%) were within the “adequate”, 6 (15.0%) the “inept” and 2 (5.0%) the “at risk” categories. There was no significant average difference between men and women in relation to these categories. In accordance with the aims of the study, mothers and fathers interactive patterns with their infants were compared as shown in Table 5.1, using paired-samples *T*-tests. No significant overall differences between mothers’ and fathers’ interactive patterns with their infants were found. Table 5.1 also reports the mean scores for the other (predictor) variables included in the study. This shows that mothers reported higher levels of depression in pregnancy and postnatal PTSD than did fathers. In order to assess the similarity of mothers and fathers within families, correlations’ were computed (Table 5.1). Maternal interaction scores were positively correlated with the equivalent paternal interaction scores,



showing large effect sizes for parental control and infant compulsivity, medium effect sizes for parental sensitivity and infant cooperation, and small non-significant effect sizes for parental unresponsiveness, infant difficulty and infant passivity. Additionally, Table 5.1 shows that mothers and fathers are not similar in terms of any of the mental health measures.

**Table 5.1 Means, t - test comparisons and correlations of parent-infant interaction and mental health variables**

	Mothers	Mothers	Fathers	Fathers	<i>t</i> -values	Effect size for <i>t</i> -	Correlations
	Mean ( SD)	Range of Scores	Mean (SD)	Range of Scores	(Mothers vs. Fathers)	differences <i>r</i>	between Mothers and Fathers <sup>a</sup>
Parental Sensitivity	8.23 ( 2.79)	2 – 14	8.23 ( 2.26)	2 – 12	0.00	.00	.38**
Parental Control	3.26 (3.64)	0 - 12	2.77 (2.86)	0 – 12	1.04	.17	.62**
Parental Unresponsiveness	2.51 (2.97)	0 – 9	3.00 (2.32)	0 – 7	-0.91	.15	.20
Infant Cooperation	7.87 (2.72)	2 – 13	7.92(2.71)	2 – 12	-0.11	.02	.38**
Infant Difficulty	2.79 (2.60)	0 – 10	2.92 (2.64)	0 – 9	- 0.26	.04	.25
Infant Compulsiveness	1.18 (2.77)	0 – 12	0.90 (2.92)	0 – 12	1.09	.16	.68**
Infant Passivity	1.92 (2.64)	0 – 9	2.26 (2.41)	0 – 8	-0.62	.10	.17
Anxiety pregnancy	6.36 (4.72)	1 – 11	6.41 (3.41)	0 - 15	-0.08	.12	-.01
Depression pregnancy	5.01 (2.85)	0 - 11	3.48 (2.15)	0 - 11	2.82**	.39	-.03
Anxiety postpartum	5.42 (3.55)	0 – 14	4.47 (3.29)	0 – 13	1.24	.18	-.11
Depression postpartum	4.17 (2.38)	0 - 9	3.40 (3.63)	0 - 13	1.24	.18	.21
PTSD postpartum	4.81 (4.73)	0 - 21	2.71 (2.69)	0 - 10	2.67**	.37	.18

*Note.* *r* = .10 (small effect), *r* = .3 (medium effect), *r* = .5 (large effect). <sup>a</sup> \**p* <.05, \*\**p*<.01, Spearman's (*rho*) one tailed test.

**Table 5.2 Risk categories for mothers and fathers interactions with their infants**

Risk category	Mother- Infant	Father – Infant	
	Interaction	Interaction	<i>OR</i>
	N (%) , n = 44	N (%) , n = 40	(95% CI)
Sensitive	9 (20.5)	7 (17.5)	1.21 (0.41, 3.63)
Adequate	20 (45.5)	25 (62.5)	0.50 (0.21, 1.20)
Inept	11 (25.0)	6 (15.0)	1.89 (0.63 , 5.70)
At risk	4 (9.1) <sup>c</sup>	2 (5.0) <sup>c</sup>	1.90 (0.33, 10.98)

*Note.* Chi Square test \*\* <.01 \*\*\* <.005. <sup>c</sup> Fischer's exact test conducted due to cell frequencies < 5. *OR* = odds ratio; *CI* = confidence interval.

#### **5.4.2 Univariate mental health predictors of parent-infant interactions**

The main aim of the study was to explore effects of parental mental health variables on parent-infant interaction. Correlation analyses were conducted to estimate these associations (see Table 5.3). For mothers, prenatal anxiety was the only mental health variable that was significantly correlated with any of the mother–infant interaction codes. Prenatal anxiety showed a significant medium sized correlation with high maternal control and a medium sized significant correlation with low maternal unresponsiveness and infant passivity. Table 5.3 further shows that for fathers, the significant correlations were in the opposite direction to the mothers, with high prenatal anxiety being moderately associated with low paternal control and high paternal unresponsiveness. Also, prenatal depression in fathers was moderately associated with significantly lower control whilst high levels of paternal PTSD and postnatal depression showed a significant positive correlation with high levels of infant difficulty and negative correlations with infant passivity.

**Table 5.3 Correlations between parental mental health and parent-infant interaction variables**

Mother-Infant Interaction								Father-Infant Interaction							
	Mother			Infant				Father			Infant				
Maternal Mental Health	Sensitivity	Control	Unresponsive	Cooperation	Difficulty	Compulsive	Passivity	Sensitive	Control	Unresponsive	Cooperation	Difficulty	Compulsive	Passivity	
Prenatal anxiety	.06	.35*	-.49**	-.02	.22	.14	-.41**	-.14	.25	-.06	-.09	.14	.14	-.28*	
Prenatal depression	.07	.06	-.08	.05	-.02	.05	.07	.13	.10	-.23	.13	.19	-.11	-.18	
Postnatal anxiety	.01	.12	-.14	-.02	.19	-.14	.06	.11	-.11	.03	.19	-.02	-.06	-.25	
Postnatal depression	-.07	-.06	.07	-.07	.07	-.07	.07	-.12	-.09	.16	-.02	-.09	.10	-.09	
Postnatal PTSD	-.08	.17	-.16	-.08	.19	-.01	-.08	.01	.15	-.23	.03	.14	-.13	-.12	
Prenatal affective symptoms	.07	.21	-.29*	.01	.11	.10	-.15	.03	.12	-.17	.05	.19	-.01	-.28*	
Postnatal affective symptoms	-.01	.04	-.06	-.02	.19	-.17	.06	.04	-.10	.09	.14	.04	-.02	-.19	
Paternal Mental Health															
Prenatal anxiety	.22	-.19	.02	.21	-.20	-.18	.14	-.03	-.36*	.44*	.05	.15	-.36**	.21	
Prenatal depression	.30*	-.14	-.06	.26*	.05	-.11	-.10	.24	-.48**	.23	.23	-.11	-.13	.14	
Postnatal anxiety	.14	-.12	-.08	.16	-.20	-.18	.13	-.07	-.01	.12	-.04	.14	-.13	-.12	
Postnatal depression	-.02	.16	-.18	-.04	.02	.05	.02	-.06	-.10	-.06	-.05	.40**	-.06	-.26*	
Postnatal PTSD	-.10	.05	.01	-.09	-.01	.01	.07	.02	.01	-.09	-.06	.35*	-.02	-.24	
Prenatal affective symptoms	.33*	-.22	-.02	.31*	-.14	-.19	.05	.04	-.46**	.48**	.09	-.03	-.30*	.27*	
Postnatal affective symptoms	.15	-.05	-.12	.15	-.14	-.12	.09	-.05	.03	.05	-.02	.33*	-.13	-.22	

Note. \* $p < .05$ , \*\* $p < .01$ , Spearman's ( $\rho$ ), one-tailed.

### 5.4.3 Multivariate mental health predictors of parent-infant interactions

To further examine the prediction of the impact of mental health on mother-infant and father-infant interaction, hierarchical multiple regression analyses were conducted. To reduce the number of mental health predictors, due to the small sample size, the total score of the Hospital Anxiety and Depression Scale was used to represent prenatal and postnatal “affective symptoms”, rather than separate anxiety and depressive measures.

Maternal and paternal prenatal mental health symptoms were entered at Step 1, followed by maternal and paternal postnatal mental health symptoms at Step 2. None of the regression models explained a significant amount of the variance for any of the mother-baby interaction outcome variables.

In contrast, models explained a significant amount of variance for four of the father-infant interaction outcome variables (Table 5.4). The model for *paternal controlling interaction* was significant,  $F(6, 33) = 3.29, p = .01$ , with the predictors accounting for 38% of the variance. The  $\beta$ -weights for paternal prenatal affective symptoms ( $\beta = -.66, t = -3.89, p = .001$ ) and maternal postnatal affective symptoms ( $\beta = -.45, t = -2.20, p = .04$ ) were significant, with high levels of affective symptoms predicting low levels of control in the father-infant interaction. Also, the overall model for *paternal unresponsive interaction* was significant  $F(6, 33) = 2.70, p = .03$ , with 33% of the variance being accounted for by the predictors. The  $\beta$ -weights for prenatal affective symptoms in the fathers ( $\beta = .54, t = 3.06, p = .004$ ) and postnatal affective symptoms in the mothers ( $\beta = .52, t = 2.47, p = .019$ ) were significant, with high levels of affective symptoms predicting high levels of unresponsiveness in the father-infant interaction. Additionally, 37% of the variance was accounted for by the model for *infant difficulty* when playing with the father,  $F(6, 33) = 3.15, p = .01$ . Individual significant

predictors were paternal prenatal affective symptoms ( $\beta = -.38, t = -2.24, p = .03$ ) and paternal postnatal affective symptoms ( $\beta = .61, t = 2.43, p = .02$ ). High levels of paternal prenatal affective symptoms predicted low infant difficulty whilst high levels postnatal affective symptoms in the father predicted high infant difficulty. For *infant passivity*, high levels of paternal prenatal affective symptoms contributed to high infant passivity ( $\beta = .49, t = 2.70, p = .01$ ) whilst high levels of paternal postnatal affective symptoms were associated with low infant passivity scores ( $\beta = -.42, t = -1.61, p = .ns$ ). The overall model explained 30% of the variance of infant passivity when playing with the father.

**Table 5.4 Hierarchical regression models (significant) of parental mental health symptoms on father-infant interaction variables**

Father- Infant Interaction																
Predictor	Paternal control				Paternal unresponsiveness				Infant difficulty				Infant passivity			
	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$	<i>B</i>	<i>SE B</i>	$\beta$	$R^2\Delta$
Step 1				.16*				.13				.02				.10
Prenatal affective symptoms (mother)	0.15	0.11	.25		-0.13	0.09	-.28		-0.01	0.10	-.01		-0.08	0.10	-.16	
Prenatal affective symptoms (father)	-0.38	0.10	.66***		0.25	0.08	.54**		-0.20	0.09	-.38*		0.24	0.09	.49**	
Step 2				.22*				.20				.35				.20
Postnatal affective symptoms (mother)	-0.23	0.10	-.45*		0.22	0.09	.52*		-0.10	0.10	-.20		0.01	0.09	.01	
Postnatal affective symptoms (father)	0.17	0.11	.40		-0.09	0.09	-.25		0.24	0.10	.61**		-0.15	0.10	-.42	
Postnatal PTSD (mother)	0.09	0.11	.16		-0.14	0.09	-.31		0.19	0.10	.36		-0.05	0.10	-.11	
Postnatal PTSD (father)	0.04	0.24	.04		-0.06	0.20	-.07		0.10	0.22	.11		-0.14	0.21	-.15	
Total $R^2$				.38**				.33*				.37**				.30*
<i>F</i>				3.29				2.70				3.15				2.33

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .  $\beta$ - values are from the final 2<sup>nd</sup> step of the regression models.



## **5.5 Discussion**

Results of the present study showed no mean-level differences regarding the patterns of dyadic interactions between the mother-infant and father-infant dyads. Additionally similarity between the interactive patterns of mothers and fathers in the same family was found, with especially high associations between maternal and paternal controlling patterns and their infants' compulsiveness. The latter finding is in line with Barnett et al.'s (2008) study, which found an interdependence of interactive patterns, especially negative ones, between mothers and fathers. The finding that a relatively high proportion of both mother-infant (34%) and father-infant (20%) interactions were classified as being "inept" or "at risk" and therefore in need of intervention (Crittenden, 2004) with 10 % of families presenting with impairment in both parents' interactions with their baby is of concern, especially as the current study was based on a relatively "low risk" community sample. Similarly, Flykt et al. (2010) also found high rates (42.3%) in a Finnish community sample of mother-infant dyads being within these intervention categories and even higher rates were found (67%) within a high psychosocial risk sample (Sidor, Kunz, Schweyer, Eickhorst & Cierpka, 2011).

### **5.5.1 Parental mental health and parent-infant interactions**

The main aim of the present observational study was to examine the impact of parental mental health on parent-infant interaction. Contrary to previous research (e.g., Beck, 1995; Cassidy et al., 1996; Murray, Fiori-Cowley, et al., 1996), no significant associations were found between maternal symptoms of pre or postnatal depression and any of the maternal sensitivity or child interaction variables. However, a few recent studies (e.g., Cornish, McMahon & Ungerer, 2008; Sidor et al., 2011) have similarly failed to find such associations. These studies suggested that factors such as chronicity and severity of depression and the additive effect of other risk factors (e.g., maternal

attachment patterns and antisocial history) may moderate such associations. These results may therefore be partly explained by the current study consisting of a low risk sample with few parents presenting with high levels of depression or other risk factors, whereas other studies have found the strongest effects amongst less advantaged samples (e.g., see Lovejoy, Graczyk, O'Hare & Neuman, 2000). Also, Sidor et al. (2011) reasoned that their lack of significant associations may have been due to differences in the measurement of mother-infant interaction (observation rather than maternal self-report). This argument may thus also be relevant to the current study, especially as Sidor et al.'s study also used the CARE index observational method.

However, the findings that high levels of maternal prenatal anxiety were associated with less optimal mother-infant interaction are in line with previous studies regarding postnatal anxiety (e.g., Feldman et al., 2009). It has been suggested that poor maternal prenatal mental health may have twofold effect on the mother-infant interaction; through biological, hormonal negative effects on the baby's regulatory systems and development (e.g., Evans et al., 2012; Correia & Linhares, 2007; Glover, 2011; Kinsella & Monk, 2009) and/or through less psychological preparation for motherhood, such as lack of prenatal bonding and/or unwanted pregnancy (Brockington, Aucamp & Fraser, 2006; Siddiqui & Hagglof, 2000). This highlights the importance of also including prenatal measures of anxiety when looking for risk factors to the parent-infant relationship.

Interestingly, the results indicated that paternal prenatal affective symptoms were associated with higher maternal sensitivity and infant-mother cooperation. Speculations about the reasons for this surprising finding may include potential compensation by mothers, where they develop a heightened sensitivity to their baby when their partners are suffering from prenatal mental health problems. A similar

compensation was observed by Edhborg, Lundh, Seimyr & Widstrom (2003), where fathers of partners reporting high levels of early depressive symptoms displayed a more optimal relationship with their babies when observed later postpartum. Alternatively, paternal prenatal depression may be a consequence of the expectant father feeling neglected by the expectant mother's possible pre-occupation and prenatal bonding with the unborn baby. Future studies may thus also benefit from including prenatal bonding measures in both parents.

Additionally, the results of the current study point to the importance of paternal affective symptoms for the father-infant interaction. Again, prenatal mental health seemed to play a significant role in the quality of the interaction. Prenatal affective symptoms (depression and anxiety) in the father predicted, for example, lower paternal control and infant difficulty but higher paternal unresponsiveness and infant passivity. This interactive pattern suggests that the father–infant interaction is more likely to be based on under-stimulation than over-stimulation by fathers with prenatal mental health problems, with lower intrusiveness but higher disengagement, a similar finding to that reported by Wilson & Durbin (2010). Disengaged and remote father-infant interactions have also been linked to early behavioural problems in children (Ramchandani et al., 2013). Flykt et al. (2010) also observed a comparable interactive pattern amongst expectant mothers, with high levels of prenatal depressive symptoms predicting lower levels of maternal control.

An opposing pattern emerged for paternal postnatal measures of PTSD and depression. These were both correlated with higher levels of infant difficulty, and lower levels of infant passivity. In the regression analysis, paternal postnatal affective symptoms in the father also significantly contributed to the variance of infant difficulty. This corresponds to other findings in mothers where postnatal depression and anxiety

have been linked to high levels of infant difficulty (Cassidy et al., 1996; Field, Healy, Goldstein & Guthertz, 1990) or difficult infant temperament (e.g., Britton, 2011).

Alternatively, high levels of infant difficulty may perturb postpartum mental health itself. However, the direction of causality is not possible to establish here, i.e. whether the father's mental health affects the infant's behaviour negatively or vice versa.

Additionally, maternal postnatal affective symptoms predicted higher levels of unresponsiveness in the father's interaction with their baby. A comparable deleterious effect rather than buffering effect was also found by Goodman (2008). Overall, the present findings suggest that father-infant interactions suffer and are more sensitive to negative mood in the mother, whilst mothers compensate to improve their interaction with their babies in the context of paternal mental health problems.

### **5.5.2 Methodological issues and future directions**

This study benefitted from including both paternal and maternal measures of observed interactions and mental health. Specific advantages with the CARE-Index measure were that it includes both over-responsiveness (control) and under-responsiveness in the assessment of parental sensitivity and also considers the infants' interactive patterns, not just the parents'. The infant's interactive pattern may also be less influenced by demand characteristics of the assessment. Another novel aspect of this study was the inclusion of PTSD and anxiety in the mental health measures, not just depression. The sample was also relatively large for a video- based study of parent-infant interaction (e.g., Beck, 1995). However, the sample size is limited statistically, resulting in a lack of power and consequently more likelihood of Type II errors. The sample also mainly consisted of white European, well-educated, two-parent families, with low depressive and anxiety symptoms, which limits the generalizability of the results. The decision to use the combined measure of anxiety and depression, rather than

analysing these separately, enabled a reduction of predictor variables in the regression analyses, but limited the possibility to understand the specific influences of these on the parent-infant interaction. Future studies should examine whether the results are applicable to other socio demographic groups and also aim to recruit a larger sample of parents, in order to investigate the separate influences of anxiety and depression on the parent-infant interaction.

Finally, a pertinent methodological issue is when the optimal time to measure parent-infant interactions is. Although this study found some significant associations between parental mental health and parent-infant interactions, more associations may show up later, as three months postpartum is still early and many parents experience transient mental health or interactional problems as part of a normal transition to parenthood. However, Kemppinen, Kumpulainen, Raita-Hasu, Moilanen & Ebeling, (2006) found a continuity of maternal sensitivity from early to late postpartum and early maternal postpartum depression has been linked to negative maternal interactional behaviours more than a year later (Edhborg, Lundh, Seimyr, Widstrom, 2001). This indicates that early measures of mental health are potentially important for later interactive behaviours, although it is possible that further links may become apparent over time. Future prospective longitudinal observational studies are needed to further clarify links between parental mental health and interactions between the parents and their infants over time.

### **5.5.3 Conclusions and implications**

The finding that a high proportion of the parent-infant dyads presented with high rates of inept or at risk interactions may imply that people are not necessarily natural parents. A clinical implication from this is that observations of the parent-infant interaction should be part of routine screening for early detection of parent-infant

relationship problems in all families, not just in high risk samples. Furthermore, preventive interventions designed for parents to learn to interact well with their infants should be provided, to prevent long term negative child outcomes. The significant and differential impact of paternal pre and postnatal mental health on the father-infant and mother-infant interaction highlights the distinct role of fathers in the family and the importance of including both parents in screening and interventions regarding mental health and relationship problems, and also that mental health risk factors should be identified in pregnancy.

## 6 Infant Developmental Outcomes: A Family Systems Perspective

### (Article 5)

Parfitt, Y., Pike, A. & Ayers, S. (in press). Infant developmental outcomes: A family systems perspective. *Infant and Child Development*.

#### 6.1 Abstract

The aim of the current study was to examine whether parental mental health, parent-infant relationship, infant characteristics and couple's relationship factors were associated with the infant's development. Forty-two families took part at three time-points. The first, at three months postpartum, involved a video recorded observation (CARE-index) of parent-infant interactions. At five months postpartum, in-depth clinical interviews (The Birmingham Interview of Maternal Mental Health) assessed parental mental health, parental perceptions of their relationship with their infant, their partner and their infant's characteristics. Finally, the Bayley Scales III was carried out 17 months postpartum to assess the infants' cognitive, language, and motor development. A higher perceived mother-infant relationship quality was significantly associated with more optimal language development, whilst a higher perceived father-infant relationship quality was associated with more advanced motor development. Additionally, maternal postnatal PTSD had a negative impact on the infant's cognitive development whilst maternal prenatal depression was associated with a less optimal infant's language development. The largest prediction was afforded by parental perceptions of their infant's characteristics. The findings indicate that such perceptions may be crucial for the infant's development and imply that negative internal parental perceptions should be considered when assessing risk factors or designing interventions to prevent negative child outcomes.

## 6.2 Introduction

Pregnancy and the first year of an infant's life is a critical time for laying the foundations for the child's future development. Research suggests that prevalence rates of early developmental problems in the under threes, range between 11 and 13 % (e.g., Skovgaard, Olsen, et al., 2007; Tough et al., 2008). The identification of children at risk for developmental problems is important, as untreated developmental problems may have significant negative impact on the individuals and have economic and social impacts on society as a whole (Tough et al., 2008). Research suggests a range of interrelated risk factors for negative child developmental outcomes, such as poor mental health of the mother (e.g., Lung, Chiang, Lin & Shu, 2009; Murray, 2009; Brouwers, Van Baar & Pop, 2001), low levels of maternal social support (Tough, Siever, Benzies, Leew & Johnston, 2010) and poor quality of the couple's relationship (Hanington, Heron, Stein & Ramchandani, 2012). Other major risk factors include an impaired parent-infant relationship and attachment problems (Murray & Cooper, 1996; Tomlinson, Cooper & Murray, 2005; Wan & Green, 2009) and also infant factors, such as prematurity (Forcada-Guex, Pierrehumbert, Borghini, Moessinger & Muller-Nix, 2006), male gender (Hay et al., 2001; Tough et al., 2008) and difficult infant temperament (Black et al., 2007).

The current study adds to this literature by including both mothers and fathers in the analysis of the associations between their mental health, relationships with infant and partner, infant characteristics, and their infant's development, using Belsky's model of determinants of parenting (1984) as a general framework. This model suggests that the parent-infant relationship (parenting) and the infant's characteristics have a direct effect on the child's development, and that parental mental health and the couple's relationship are related to infant outcomes by the effect they have on parenting.



However, more recent evidence has also suggested direct links between parental mental health, the couple's relationship and infant developmental outcomes.

### **6.2.1 Parental mental health and infant development**

There is ample evidence of adverse effects of maternal postnatal depression on the infant's cognitive, emotional and language development, behaviour and mental health (Lung et al., 2009; Murray & Cooper, 1996; Murray, 2009; Quevedo et al., 2012). Links between paternal depression and less optimal language development (Paulson, Keefe & Leiferman, 2009) and adverse emotional and behavioural outcomes in children have also been found (Ramchandani et al., 2005).

Mental health in pregnancy may be especially important for later child outcomes. Accumulating evidence suggests exposure to maternal prenatal anxiety and stress in the womb, may have long term negative developmental consequences for the baby (e.g., Glover, 2011; Punamaki et al., 2006; Van Batenburg-Eddes et al., 2009). For example, the results of a large longitudinal study (Evans et al., 2012) suggested that prenatal exposure to depression may be more predictive of less optimal child cognitive development than postnatal depression. It has been suggested that this can be explained by abnormal physiological pathways within biological systems (e.g., neuroendocrine, immune and cardiovascular systems) involved in pregnancy and stress physiology, through which maternal prenatal mental health exerts a risk on child development by affecting fetal development (Federenko & Wadhwa, 2004; Field, Diego & Hernandez-Reif, 2006).

The majority of research regarding the association between postnatal parental mental health and the infant's development has focused on depression. Less is known about the effect of other aspects of parental mental health, such as anxiety and

posttraumatic stress disorder (PTSD), on the infant's subsequent development. A systematic review of the effects of postnatal maternal anxiety on children (Glasheen, Richardson & Fabio, 2010) found that the strongest adverse effects were on somatic, behavioural and emotional problems in the child, but with inconclusive evidence regarding the effect on children's cognitive and general development. Also, Bosquet et al. (2011) found that maternal PTSD symptoms six months postpartum were associated with measures of emotional regulation when the child was 13 months old. Similarly, Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex & Ansermet, (2003) found that the severity of PTSD symptoms amongst parents of premature babies was a significant predictor of their children's subsequent regulatory (e.g., sleeping and eating) problems. However, no known studies have assessed infant developmental outcomes in relation to postnatal PTSD.

### **6.2.2 Infant characteristics and infant development**

Early difficult infant temperament has been associated with elevated rates of parental mental health problems (e.g., Bang, 2011; Melchior et al., 2011), a less optimal parent-infant relationship (Hofacker & Papousek, 1998; Zhu et al., 2007), child behavioural problems (Bosquet et al., 2011; Dale et al., 2011; Jessee, Mangelsdorf, Shigeto & Wong, 2012) and also identified as a predictor of later difficult child temperament (Canals, Hernandez-Maranez & Fernandez-Ballart, 2011). Parental perceptions of their infant's characteristics have also been associated with the child's development (Hernandez-Martinez, Canal Sans, Fernandez-Ballart, 2011; Molfese et al., 2010). However, generally it should be noted that the associations between different variables, such as parental mental health and infant temperament, are reciprocal, not just one way. One aspect of infant characteristics is infant sleep disturbance, which has been

associated with worse parental pre and postnatal mental health and child behavioural problems (Baird, Hill, Kendrick & Inskip, 2009; Britton, 2011; Field et al., 2007; Lam, Hiscock & Wake, 2003). There is however a lack of studies looking at the link between infant's early temperament, parental mental health and children's subsequent cognitive, language and motor developmental outcomes.

### **6.2.3 The parent-infant relationship and infant development**

Apart from the physiological pathways between women's prenatal mental health and child outcomes as mentioned above, the parent-infant relationship itself may serve as an important behavioural pathway between parental mental health and child outcomes (e.g., Grace, Evindar & Stewart, 2003; Westbrook & Harden, 2010). The parent-infant relationship has a central position in Belsky's process model (1984), as having a direct effect on the child's development, but also as a mediator of other parental and child predictors. However, although several studies (e.g., Grace, Evindar & Stewart, 2003; Murray, FioriCowley, Hooper & Cooper, 1996; Westbrook & Harden, 2010) have suggested the existence of mediation effects between parental mental health and child outcomes through the parent-infant relationship, these effects are not consistently found (e.g., McManus & Poehlman, 2012).

Research shows that the quality of mother-infant interaction may be affected by maternal depression (for a review, see Field, 2010; Leinonen, Solantaus & Punamaki, 2003; for a meta-analysis see Lovejoy, Graczyk, O'Hare & Neuman, 2000), with evidence of deficiencies in the mother's responsiveness and emotional involvement (Black et al., 2007; Murray, FioriCowley, et al., 1996) or hostile and intrusive interactions (Mantymaa, Puura, Luoma, Salmelin & Tamminen, 2004). It has been suggested that deficient maternal interactions and caregiving consequently affect the

infant's responsivity (Field, 2010) and attention (Steadman et al., 2007) therein contributing to less optimal cognitive (Slater, 1995) and language (Stein et al. 2008) child developmental outcomes. Some studies have specifically linked negative parental perceptions and representations of their infant to a less optimal parent-infant relationship and subsequent child developmental or behavioural outcome (Dollberg, Feldman & Keren, 2010; Hernández- Martinez et al., 2011).

Although most studies have focused on the mother-infant relationship, recent research on the influence of fathers' parenting and child development is also emerging. For example, the extent of fathers' positive involvement in parenting has been shown to reduce the likelihood of cognitive delays in their children, especially for boys (Bronte-Tinkew, Carrano, Horowitz & Kinukawa, 2008). Conversely, Ramchandani et al. (2013) found that paternal disengagement and remote interaction with their babies at three months predicted child externalising behavioural problems at one year of age.

#### **6.2.4 The couple's relationship and infant development**

The above research shows that the family should be viewed as a system (e.g., Bell et al., 2007; Cowan & Cowan, 2002) with an awareness of both parents' contribution to their child's outcomes and also acknowledgement of possible spillover effects between the couple's relationship and parent-infant relationship subsystems (Erel & Burman, 1995). For example, the couple's relationship problems may negatively affect the parent-infant interactions (e.g., Mantymaa, Tamminen et al., 2006), and thereby indirectly contribute to the child's outcomes (Carlson, Pilkauskas, McLanahan & Brooks-Gunn, 2011; Leinonen et al., 2003; Westbrook & Harden, 2010) through parenting. Conflicts within the couple's relationship may also negatively indirectly influence the child's mental health, through having an effect on the child's

emotional security (e.g., Davies, Harold, Goeke-Morey & Cummings, 2002; Koss et al., 2011, Kouros, Cummings & Davies, 2010). Recently, the couple's relationship has also been found to serve as a risk factor for adverse child outcomes (Hanington et al., 2012).

#### **6.2.5 The present study**

In summary, research suggests that poor parental mental health is a risk factor for negative infant developmental outcomes, but has mainly focused on the effects of maternal postnatal depression on the infant's development. Research also suggests that family relationship dynamics, primarily the parent-infant relationship itself may be an important mechanism by which parental mental health, infant characteristics and the couple's relationship affect the infant's development. However there is limited research including all of these factors and fathers. In addition, studies looking at risk factors for negative child developmental outcomes need to be extended to also include other mental health issues, such as PTSD and anxiety amongst both mothers and fathers.

The main aim of this study was to examine whether parental mental health, parent-infant relationship, infant characteristics and couple's relationship variables were directly or indirectly associated with the infant's cognitive, language or motor development. On the basis of previous research findings and Belsky's model, it was predicted that a less optimal perceived and observed parent -infant relationship, poor parental mental health, low quality of the couple's relationship and difficult infant temperament would be associated with less optimal infant developmental scores. Whilst parental mental health, the parent-infant relationship and infant characteristics would be directly associated with the infant's development, it was also predicted that the parent-infant relationship would act as a mediator between parental mental health, the couple's relationship, the infant's temperament and the infant's development.

## 6.3 Method

### 6.3.1 Participants

Participants were 42 families recruited from The Sussex Journey to Parenthood Study (UK), a longitudinal study of the transition to parenthood from pregnancy to the postpartum. Inclusion criteria for the Journey to Parenthood study were that the women were nulliparous, cohabiting with their partner, fluent in English, and over 18 years old. The majority of the participants of the present study were Caucasian (86%) and 85 % had undergone higher education (diploma and beyond). The babies were born healthy and full term. At the time of the child development assessment, the infants; 23 girls and 19 boys, were between 16 and 20 months old ( $M = 17.17$  months,  $SD = 0.73$ ). At the time of recruitment, the length of the couple's relationship ranged from 1 to 25 years ( $M = 6.36$  years,  $SD = 4.04$ ) with the women aged between 26 and 46 years ( $M = 33.41$  years,  $SD = 5.08$ ) and the men aged between 26 and 44 years ( $M = 34.20$ ,  $SD = 4.75$ ).

### 6.3.2 Procedure

Ethical approval was obtained from the NHS Research Ethics Committee (Appendix D) and the University Research Governance Committee. A subsample of participants of the Sussex Journey to Parenthood questionnaire study took part in an observational study of their interaction with their baby approximately three months after the birth of their baby. Forty five families agreed to take part in a short parent-infant play interaction, conducted separately with the mother and father and their baby at home and videotaped for later coding. Next, the parents who took part in the observational study were also invited for a clinical interview (Birmingham Interview for Maternal Mental Health; BIMMH), which took place approximately 5 months after the birth of their first baby. There was no attrition between the observations of interactions and the

interviews. The interviews were conducted separately with the mothers and fathers in their homes, and took between 75 and 120 minutes to complete. Finally, 17 months after birth, the same families were invited to have a developmental assessment of their baby. Two families had moved away, and were not available and one of the families declined to take part, resulting in the final sample of 42 families.

The infant developmental assessment was carried out in the participants' homes by a researcher who was qualified and trained in the use of the Bayley Scales of Infant Development III, following the usual procedures (Bayley, 2006). One or both parents were present throughout the assessment, which lasted between 45 minutes and 1 ½ hours. Written informed consent was obtained before the start of each assessments, and confidentiality, anonymity and the right to withdraw at any time was assured. Participants were debriefed and were also offered a brief summary of their baby's development after the assessment.

### **6.3.3 Measures**

**Infant Development.** The infant's cognitive, language and motor development was assessed using the Bayley Scales of Infant Development III (Bayley, 2006). It is composed of rating scales and qualitative observations. It is an individually administered examination that assesses the current developmental functioning of the infant. The Bayley Scale is a widely used tool for assessing children's development (e.g., Black et al., 2007; Huhtala et al., 2011). It has been standardised and extensively reviewed for its psychometric quality and tested for reliability ( $r$ , ranging from .86 to .93) and validity using large samples of children with and without developmental delay (Bayley, 2006). Raw scores from each scale were converted to three composite scores

( $M = 100$ ,  $SD = 15$ ), one for cognition, one for language and one for motor development.

**Mental health, relationship and infant factors.** The Birmingham Interview of Maternal Mental Health (BIMMH; 5<sup>th</sup> edition, Brockington, Chandra et al., 2006), a semi-structured clinical interview was used to assess parental mental health. This interview has previously been used in a number of international reliability studies (e.g., Brockington, Aucamp & Fraser, 2006; Chandra, Bhargavaraman, Raghunandan & Shaligram, 2006) and used to validate the Postpartum Bonding Questionnaire (Brockington, Fraser & Wilson, 2006). Anxiety and depression were rated on a 0 – 3 point scale (none, mild, moderate and severe; rated 0-3), PTSD, on a 0 – 2 point scale (none, some evidence and severe). Ratings related to the other key variables under investigation were also derived from the Birmingham Interview. Principal component analysis was performed on groups of these interview items, to create summary scores for the inter-correlated items, in order to reduce the number of predictor variables and in the same time retain as much information as possible. Items in the parent-infant relationship section of the Birmingham interview were reduced to two factors of parental perceptions of their relationship with their infant, one for mothers (explaining 53%) and one for fathers (explaining 62%). Items included in these factors were; angry response, onset of positive feelings, nature and strength of feelings and rough treatment towards baby. The infant characteristics factor included both maternal and paternal reports of their infant's temperament and the infant's sleeping difficulties, explaining 62% of the variance. The couple's relationship factor was derived from a combination of items for both parents' postpartum support and relationship with the partner, explaining 61% of its variance. In all cases, relevant items were summed using unit weights to form scale scores.



**Parent-infant interaction.** The CARE-index procedure (Crittenden, 2004) was utilized to analyse and code short (3 – 5 minute) video recordings of parent-infant interactions on different aspects of the parent and infant's dyadic interactional behaviour. For the current study, the global dyadic synchrony score was used. This score combines the judgments of parental sensitivity and infant cooperation (Crittenden, 2004) and ranges from 0 -14, with a high score, indicating a more optimal interactive relationship. Reliability was tested for 12% of the video-interactions. The intra class correlation coefficient (ICC; two-way random, absolute agreement, single measure) for this score was .86, which indicates an excellent agreement between the main rater and first author (YP).

#### **6.3.4 Statistical analysis**

Correlational analyses and multiple regression analyses were conducted to examine the associations between variables and impact of the predictor variables on the children's development. Thereafter, mediation effects were examined in accordance with Baron and Kenny's criteria (1986), to explore whether the association between the infant's characteristics, parental mental health and the couple's relationship with cognitive, language and motor development were mediated by the quality of mother-infant and father-infant perceptions of their relationship or observed mother-infant and father-infant dyadic interaction. For each developmental outcome, mediation was tested through three regression models, separately for each predictor, mediator and outcome. The assumptions of multiple regression were met regarding multicollinearity, homoscedasticity, independent and normally distributed errors. Additionally, the developmental outcomes were normally distributed.

## 6.4 Results

### 6.4.1 Preliminary analysis and descriptives

Missing data analysis revealed that 84% of parents had completed all of the measures included in the present study. Parents with missing data ( $n = 14$ , 4 women and 10 men) did not differ from parents with complete data on ethnicity ( $\chi^2(1) = 0.86$ ,  $p = .35$ ), marital status ( $\chi^2(1) = 0.70$ ,  $p = .40$ ), gender ( $\chi^2(1) = 3.08$ ,  $p = .08$ ) or education ( $\chi^2(1) = 0.10$ ,  $p = .75$ ). The little MCAR test was not significant ( $\chi^2 = 18.90$ ,  $p = ns$ ). This indicates that the data was missing completely at random (MCAR), which suggests that the Expectation-Maximization (EM) method for imputation of data is suitable (Tabachnick & Fidell, 2007). Missing data for the predictor variables were therefore replaced using the EM method, which concurs with the way similar studies have dealt with missing data (e.g., Flykt, Kanninen, Sinkkonen & Punamaki, 2010).

Mean scores for infant's developmental ages are reported in Table 6.1. It shows that on average the infants' developmental age is within normal age limits with slightly higher means than their actual age on most of the scales, and just below their actual age on the gross motor scale. However, when looking at the range of developmental outcomes, it should be noted that there was variability amongst the children, with some being considerably less developed than others, at the time of the assessment. Similarly, Table 6.1 also indicates that all the composite scores of the infants' performance on the Bayley Scales III are within normal limits. Descriptive statistics (means and standard deviations) for parental mental health and parent-infant interaction variables are also given in Table 6.1.

#### **6.4.2 Univariate predictors of infant development**

To examine the prediction that a less optimal parent-infant relationship, parental mental health problems, a low quality of the couple's relationship and negative infant characteristics were associated with less optimal infant developmental scores, correlation analyses were conducted on the main variables of interest. Correlations between these are presented in Table 6.2. As shown, the infant's negative characteristics were substantially associated with less optimal cognitive, language and motor developmental outcomes. Also, maternal perceptions of a less optimal mother-infant relationship was moderately associated with a poorer language development for the infant and paternal perceptions of a less optimal father-infant relationship was moderately associated with a poorer motor development. For mental health issues, maternal postnatal PTSD was moderately associated with poorer cognitive outcomes, whilst there was a moderate correlation between maternal prenatal depression and less optimal language development. All of these significant correlations were in the predicted direction, with the higher developmental scores, the less difficult infant characteristics, a more optimal parent-infant relationship and better parental mental health.

**Table 6.1 Means and standard deviations for Bayley Scales developmental ages and composite scores, parental mental health and parent-infant interactions variables.**

	Range	Mean (SD)
Scores		
Cognitive development (months) <sup>a</sup>	12 - 21	18.00 (2.06)
Receptive development (months) <sup>a</sup>	10 - 26	19.70 (3.40)
Expressive development (months) <sup>a</sup>	8 - 22	17.95 (3.17)
Fine motor development (months) <sup>a</sup>	11 - 23	19.51 (2.44)
Gross motor development (months) <sup>a</sup>	7 - 20	16.40 (3.19)
Cognitive composite <sup>b</sup>	75 - 125	101.90 (10.99)
Language composite <sup>b</sup>	68 - 129	106.98 (14.58)
Motor composite <sup>b</sup>	64 - 121	100.83 (12.07)
Maternal prenatal depression	0 - 3	0.48 (0.77)
Maternal postnatal depression	0 - 2	0.52 (0.70)
Maternal prenatal anxiety	0 - 3	0.91 (1.00)
Maternal postnatal anxiety	0 - 3	0.86 (0.98)
Maternal PTSD	0 - 2	0.21 (0.51)
Paternal prenatal depression	0 - 3	0.32 (0.67)
Paternal postnatal depression	0 - 2	0.24 (0.60)
Paternal prenatal anxiety	0 - 3	0.98 (0.88)
Paternal postnatal anxiety	0 - 2	0.46 (0.64)
Mother-infant global synchrony <sup>c</sup>	2 - 13	7.83 (2.64)
Father-infant global synchrony <sup>c</sup>	2 - 12	7.69 (2.42)

*Note.* N = 42. <sup>a</sup> The mean age of the infants at the time of the Developmental Assessment was 17.2 months. <sup>b</sup> A score of 100 on any of the composites defines the average performance of a given age group. Scores of 85 and 115 are 1 SD below and above the mean. About 68 % of all infants obtain composite scores between 85 - 115, about 98 % score in the 70 - 130 range. Nearly all infants obtain scores between 55 and 145. <sup>c</sup> These scores are derived from observations of the parent-infant relationship.

**Table 6.2 Correlations between infant developmental scores and predictor variables.**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1.Cognitive composite	1																		
2. Language composite	.63*	1																	
3. Motor composite	.67*	.63**	1																
4. Prenatal Anxiety Mother	-.02	-.10	-.02	1															
5. Prenatal Depression Mother	-.21	-.38*	-.08	.59**	1														
6. Postnat Anxiety Mother	-.07	-.11	-.13	.58**	.29*	1													
7. Postnat Depression Mother	-.16	-.09	-.05	.04	.25	.36**	1												
8. PTSD postnatal Mother	-.35*	.06	-.12	.09	-.14	.21	.15	1											
9. Prenatal Anxiety Father	-.07	.01	-.06	.38**	.30*	.21	.23	.17	1										
10. Prenat Depression Father	-.19	-.20	-.11	.36**	.34*	-.04	.01	-.12	.66**	1									
11.Postnatal Anxiety Father	.15	-.02	.03	.27*	.15	.12	-.06	-.05	.41**	.42**	1								
12. Postnat Depression Father	-.03	-.19	-.12	.31*	.24	.22	.02	-.17	.43**	.61**	.72**	1							
13. PTSD postnatal Father	.02	.01	.11	-.13	-.16	-.35*	-.07	-.01	.02	.03	-.27*	-.28*	1						
14. Couple relationship	-.06	-.12	-.13	.12	.18	.15	.14	-.03	.34*	.22	.11	.31*	.15	1					
15. Infant characteristics	-.40**	-.55**	-.32*	.25	.38**	.39**	.17	.25	.34*	.14	.11	.20	-.08	.37**	1				
16. MotherInfant Relationship <sup>a</sup>	-.24	-.30*	-.05	.21	.21	.20	.33*	-.10	.20	.44**	.23	.44**	-.17	.18	.28*	1			
17. FatherInfant Relationship <sup>a</sup>	-.08	-.25	-.26*	-.09	-.10	.03	.04	-.01	-.02	.02	.34*	.42**	-.13	.33*	.35*	.32*	1		
18. Dyadic Synchrony Mother <sup>b</sup>	.06	.21	.24	-.19	-.19	-.24	-.03	-.05	-.47**	-.12	-.16	.04	.11	.10	-.22	.11	.06	1	
19. Dyadic Synchrony Father <sup>b</sup>	.03	.22	.20	-.18	.05	-.23	.01	-.22	-.02	.14	-.13	.19	-.21	.02	-.17	.16	-.08	.41**	1

Note: \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . Spearman's, one tailed. <sup>a</sup> Perceived parent-infant relationship, derived from interviews. <sup>b</sup> Observed parent-infant relationship, derived from observations.

### 6.4.3 Multivariate predictors of infant development

To further examine the impact of the above predictor variables on the infant's development, three multiple regression analyses were conducted. A data driven approach was used, where predictors that yielded medium sized correlations  $\geq .2$  (Cohen, 1992) with the infant developmental outcomes were entered into the regressions in one step to test the independent contribution by each of these on the infant's cognitive, language and motor developmental outcomes.

The results of the first regression analysis regarding the infant's cognitive development are shown in Table 6.3. This model included maternal prenatal depression, maternal postnatal PTSD, maternal perceptions of the mother-infant relationship and the infant's characteristics factors. Overall the predictors explained 27.5% of the variance of the cognitive composite score,  $F(4, 37) = 3.50, p = .016$ , with a unique significant contribution of maternal postnatal PTSD ( $\beta = -.34, t = -2.20, p = .03$ ).

Regression results for the infant's language development are detailed in Table 6.4. The model included maternal and paternal prenatal depression, parental perceptions of the mother-infant, the father-infant relationship and the infant's characteristics factors as well as the mother-infant and father-infant dyadic interaction synchrony scores.

The overall regression model for language development was significant,  $F(7, 34) = 3.15, p = .01$ , with 39% of the variance accounted for by the predictors. The only predictor adding a unique significant contribution to infant language development, and thus in line with the predictions, was the infant's characteristics ( $\beta = -.35, t = -2.13, p = .04$ ). The total regression model for motor development included the infant's characteristics, the perceived father-infant relationship factor as well as the mother-infant and father-infant dyadic interaction synchrony scores derived from observations (Table 6.5). However, the total model failed to reach significance with only 18 % of the

variance being accounted for by the predictors,  $F(4, 36) = 1.91, p = .13$  and contrary to predictions, none of the individual predictors contributed significantly to motor development.

**Table 6.3 Multiple regression analyses predicting the infant's cognitive development.**

Predictor	Cognitive development		
	<i>B</i>	<i>SE B</i>	$\beta$
Prenatal depression (women)	-1.98	2.23	-.14
Postnatal PTSD (women)	-7.08	3.21	-.34*
Mother-infant relationship <sup>a</sup>	-.71	.57	-.19
Infant's characteristics	-.74	.59	-.21
Total $R^2$	.28*		
<i>F</i>	3.50		

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . <sup>a</sup> Perceived parent-infant relationship, derived from interviews.

**Table 6.4 Multiple regression analyses predicting the infant's language development.**

Predictor	Language Development		
	<i>B</i>	<i>SE B</i>	$\beta$
Prenatal depression (women)	-4.14	3.01	-.22
Prenatal depression (men)	-0.82	3.45	-.04
Mother-infant relationship <sup>a</sup>	-0.70	0.84	-.14
Father-infant relationship <sup>a</sup>	-0.43	0.71	-.09
Dyadic Synchrony: mother-infant <sup>b</sup>	0.18	0.86	.03
Dyadic Synchrony: father-infant <sup>b</sup>	1.05	0.93	.17
Infant's characteristics	-1.66	0.78	-.35*
Total $R^2$	.39**		
<i>F</i>	3.15		

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . <sup>a</sup> Perceived parent-infant relationship, derived from interviews. <sup>b</sup> Observed parent-infant relationship, derived from observations.

**Table 6.5 Multiple regression analyses predicting the infant's motor development.**

Predictor	Motor Development		
	<i>B</i>	<i>SE B</i>	$\beta$
Father-baby relationship <sup>a</sup>	-0.73	0.61	-.20
Dyadic Synchrony: mother-infant <sup>b</sup>	0.76	0.77	.17
Dyadic Synchrony: father-infant <sup>b</sup>	0.45	0.83	.09
Infant's characteristics	-0.80	0.65	-.21
Total <i>R</i> <sup>2</sup>	.18		
<i>F</i>	1.91		

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . <sup>a</sup> Perceived parent-infant relationship, derived from interviews. <sup>b</sup> Observed parent-infant relationship, derived from observations.

#### 6.4.4 Mediation analysis

Finally, to test the hypothesis that the parent-infant relationship would act as a mediator between parental mental health, the couple's relationship, the infant temperament and the infant's development, mediation was tested through three regression models, separately for each predictor, mediator and developmental outcome.

For the cognitive developmental outcome, the first regression models showed that both maternal PTSD,  $F(1, 40) = 5.62, p = .02$ , and the infant's characteristics,  $F(1, 40) = 7.56, p = .01$ , each significantly predicted the cognitive outcome. In the second regression models, only the infant's characteristics was significantly associated with one of the mediators, the perceived father-infant relationship,  $F(1, 40) = 5.55, p = .02$ . However, in the third regression model, the mediator (the father's perception of the father-infant relationship) failed to significantly predict the outcome (cognitive development), whilst the infant's characteristics remained significantly associated with the outcome ( $\beta = -.42, t = -2.71, p = .01$ ).

For the language developmental outcome, a similar pattern of associations was found, where maternal prenatal depression [ $F(1, 40) = 6.84, p = .01$ ] and the infant's



characteristics,  $F(1, 40) = 17.21, p = .001$ , fulfilled the first criteria of significantly predicting the language developmental outcome, with only the infant's characteristics factor being significantly associated with one of the mediators, the father-infant relationship factor,  $F(1, 40) = 5.55, p = .02$ . As above, the perceived father-infant relationship was not a significant predictor of the language outcome in the third regression analysis, whilst the infant's characteristics factor remained significant ( $\beta = -.53, t = -3.69, p = .001$ )

For the motor developmental outcome, the infant's characteristics factor was the sole predictor that reached significance in the first regression analysis,  $F(1, 39) = 4.50, p = .04$ . Also, as above, the infant's characteristics was only significantly associated with one of the mediators, the perceived father-infant relationship factor. However, in the third regression analysis, neither the infant's characteristics nor the father-infant relationship factor reached significance in predicting the motor developmental outcome. These results, contrary to the hypothesis, indicate that none of the parent-infant relationship variables mediated the relationship between parental mental health, the infant's characteristics or the couple's relationship and the developmental outcomes.

## 6.5 Discussion

This study examined the association between parental mental health, the infant's characteristics, the couple's relationship, parental perceptions of the parent-infant relationship, parent-infant interaction and infant's cognitive, language and motor development, using interviews and observations. The results showed that parent's perceptions of their infant's characteristics were an important predictor of children's cognitive, language and motor development, whilst the mother's perceptions of the mother-infant relationship was mainly associated with the child's language development

and the father's perception of the father-infant relationship with the child's motor development. However, no associations were found between observed parent-infant interactions and the infant's development. Amongst the parental mental health variables, maternal postnatal PTSD was predictive of less optimal infant cognitive development and maternal prenatal depression was significantly associated with less optimal infant language development. The hypotheses were thus partially supported. Contrary to predictions, none of the parent-infant relationship variables acted as mediators between the other predictors and infant's developmental outcomes. The following discussion further explores these findings in relation to previous research, Belsky's model of parenting (1984) and methodological issues and implications.

#### **6.5.1 Parental mental health and infant development**

It was hypothesised that pre and postnatal mental health (depression, anxiety and PTSD) would be associated with children's development. Contrary to evidence from several previous studies (e.g., Murray, 2009; Paulson et al., 2009; Ramchandani et al., 2005; Quevedo et al., 2012), no significant associations between maternal or paternal postnatal depression and child developmental outcomes were found. These inconsistent results may be partly due to measurement issues as previous research has predominantly used self-report questionnaires to measure mental health. A recent study (Keim et al., 2011) that used interviews to measure maternal psychological health (anxiety, depression and stress) and infant cognitive development also found no evidence of negative effects on the child's development from poor psychological health, but on the contrary found that moderate psychosocial stress was associated with accelerated motor and language development. Another explanation for the lack of association between parental depression and infant development at 17 months postpartum in the present

study could be that such effects are not apparent until later on in the child's development. For example, a large Taiwanese birth cohort study (Lung et al., 2009) did not find any significant effects of parental mental health on the infant's language and social development at 18 months postpartum, but at 36 months this effect became significant. Fletcher, Feeman, Garfield and Vimpani (2011) similarly found that early paternal depression predicted child outcomes 4 years later. This highlights the importance of long-term follow ups of children's developmental outcomes in relation to parental mental health. Also, parental mental health symptoms should be followed up over time to enable analyses of any differential effects of early, concurrent and chronic mental health problems on child developmental outcomes.

In contrast, significant associations were uncovered between maternal prenatal depression and language development. This finding corresponds to previous research suggesting that prenatal exposure to depression may be even more detrimental and predictive of child developmental outcomes than parental postnatal mental health (e.g., Evans et al., 2012; Talge, Neal & Glover, 2007). Importantly, the current study also found that maternal postnatal PTSD was a significant predictor of a less optimal cognitive development for the infant. As a novel finding this requires replication and further examination of the underlying mechanisms. Although, no previous studies have examined this, Bosquet Enlow et al. (2011) found that maternal postpartum PTSD symptoms were associated with difficulties for the infant to regulate emotions at 13 months postpartum. It could be speculated that this may reduce the infant's capacity to attend to cognitive learning activities and result in a less optimal cognitive development. Another speculative mechanism could be the mother's insecure attachment style which may have increased her vulnerability to develop PTSD (e.g., Iles, Slade & Spiby, 2011), also resulted in harmful effects on the infant's cognitive development. Other possible

reasons may be that mothers with PTSD may avoid contact and play with the baby (Nicholl & Ayers, 2007) or similarly to mothers with postnatal depression lack contingent responses which in turn limit their baby's exposure to inferential learning (e.g., Hay et al., 2001).

### **6.5.2 The couple's relationship and infant development**

Contrary to predictions and recent research (e.g., Hanington et al., 2012), the couple's relationship was not associated with any of the infant developmental outcomes in the present study. However, the results of the present study demonstrated a significant association between the father's perception of the couple's relationship and the father-infant relationship. This is in line with Erel and Burman's "spillover hypothesis" (1995) and other evidence of the couple's relationship being predictive of a better parent-infant relationship (Carlson et al., 2011), especially for the paternal parenting behaviour (Florsheim & Smith, 2005). Contrary to Belsky's model and previous research (e.g., Leinonen et al., 2003; Westbrook & Harden, 2010) and as discussed below, no mediation effects occurred through the perceived parent-infant relationship or observed parent-infant interaction between the couple's relationship and infant development.

### **6.5.3 Infant characteristics and infant development**

A key finding of this study was that the infant's characteristics factor, which included both parents' perceptions of their infant's temperament and sleep disturbances, was an important predictor of all three infant developmental outcomes. This finding supported the hypothesis and Belsky's model (1984) which suggests a direct effect of infant characteristics on the infant's development. Empirical evidence also agrees that early infant characteristics are an important factor to consider when predicting the

child's developmental (Hernández- Martinez et al. , 2011) and behavioural outcomes, especially when combined with parental mental health problems (e.g., Black et al., 2007; Jessee et al., 2012).

Apart from Hernández- Martinez et al., (2011), there is very limited research regarding parental perceptions of their infant's characteristics in relation to their mental health, their relationship with their infant and infant developmental outcomes. It would also be necessary to follow the trajectories of the child's development across the first years of development in order to analyse whether different factors play a role over time. For example, Feldman and Eidelman (2009) suggested that although biological infant characteristics, such as the infant's neonatal vagal tone at birth was initially linked to the baby's cognitive and social emotional development across the first year, environmental factors such as parental mental health, interfered with the child's development at a later stage. In the current study, the infant's development was assessed at one time point only. This meant that the infant's earlier development could not be controlled for. However, it may be possible, that the parental perceptions of their infant's characteristics included aspects of the infant's development. For example, a parent with a developmentally more able child, may also perceive their child as more temperamentally "easy". One other aspect of the baby's characteristics that has been linked to less optimal child developmental outcomes is male gender (e.g., Tough et al., 2008). Infant gender was therefore initially included in the analysis, but no significant associations were found with the infant's gender and any of the other variables, so was therefore excluded.

#### **6.5.4 The parent–infant relationship and infant development**

The role of parental perceptions of the parent-infant relationship and parent-infant interactions for the infant's developmental outcome were of central importance to this study. The results are partly in line with the prediction of a significant association between these and child development. It was found that the perceived mother-infant relationship was significantly associated with the language development, and also that the perceived father-infant relationship was significantly correlated with the motor development. However, neither the mother-infant nor father-infant global dyadic interaction scores reached significance in their association with developmental outcomes, although the correlations were in the predicted direction. Furthermore, none of the relationship variables made a unique contribution to the variance of any of the developmental outcomes. The link between the mother-infant relationship and language development concurs with other studies. For example, Leigh, Nievar and Nathans (2011) found that sensitive mother-infant interactions positively influenced the child's later expressive language and Stein et al., (2008) found that a poorer quality of maternal caregiving at 10 months predicted a lower language outcome at 36 months.

There is sparse research with which to compare the finding of a link between the father-infant relationship and children's motor development. However, one speculative explanation for this comes from a study (Liu, Liu & Lin, 2001) which concluded that physical touch was beneficial to the baby's psychomotor development. As the father's play with their baby is characterised by being more physically stimulating than the mother's play (e.g., Kobayashi, 2008; Lewis and Lamb, 2003), the baby who has a more optimal relationship with their father, may get extra stimulation through touch and affection from the father (Combs-Orme & Renkert, 2009), which consequently aids their motor development. These results indicate that mothers' and fathers' relationships

with their infant may influence different areas of their development. Further studies of child developmental outcomes may therefore benefit from comparing the types of play and care activities that mothers and fathers engage in with their infant and later child developmental outcomes.

Finally, it was predicted that the parent-infant relationship would have a mediating role between the other variables and the infant's developmental outcomes, but no such mediation effect were found. The lack of significant mediation effects of the parent-baby relationship may be due to methodological issues, such as the small sample size (see below). Another methodological limitation and potential explanation for the lack of mediation effects could be that the observational measure of the parent-infant interaction was collected a few weeks before the parental mental health interview measure. However, similarly to the current study, McManus and Poehlmann (2012) found no mediation effects of the quality of parent-infant interaction between maternal depression and children's cognitive development.

#### **6.5.5 Methodological issues and future directions**

This study benefitted from “gold standard” methods with direct observations, in-depth interviews and assessments of the infant's development. The benefit of using face-to-face interview measures rather than self-report measures for predicting children's outcomes has previously been acknowledged by Pawlby, Sharp, Hay and O'Keane (2008). As previously discussed, different measurement approaches are likely to influence results of studies. In the current study, the interview measure and observational measure for the parent-infant relationship differed in their links with child development, and were not significantly correlated with each other. These measures thus reflect different aspects of the parent-infant relationship. Interestingly, the

interview measure appeared to be a better predictor of the infant's development than the observational measure of the parent-infant interaction. One reason for this could be that the observational measure was collected at a slightly earlier time point than the interview measure. However, the predictive power of self-reported parental mental representations and parental beliefs about their relationship with their baby has been found in other studies of child behaviour outcomes (e.g., Barnett, Shanahan, Deng, Haskett & Cox, 2010). Flykt et al. (2010) suggested that interview measures of the parent-infant relationship reflect parents' 'attachment-related internal working models' (e.g., Fonagy & Target, 2002) to a greater extent than direct parent-infant interactions, which are only snap-shots of the relationship, whereas parents' reflections represent many hundreds of hours of experience.

Similarly, research suggests that specific facets of parenting, such as the capacity for a parent to mentalize (Slade, Grienberger, Bernbach, Levy & Locker, 2005) and to be mind-minded (Meins et al., 2003) in their relationship with their infant may be especially important for positive child outcomes, such as the child's eventual attachment security (Slade et al., 2005), language acquisition and ultimately more optimal scholastic, emotional, social and behavioural adjustments (Berlin, Cassidy & Appleyard, 2008). Mind mindedness has also been linked to parental prenatal predictions of their infants' characteristics (e.g., Arnott & Meins, 2008) and may thus help to explain the mechanisms by which parental perceptions of their infant's characteristics was significantly linked to the infant's later developmental outcome in the present study.

These findings highlight the need to consider parent's verbal reports of their internal perceptions of their baby and their relationship when designing interventions to prevent poor child outcomes and to include measures accounting for parental internal



representations of their baby in future research of risk factors for negative child outcomes. Prenatal interventions may be especially useful in helping both parents to form a positive representation and interpretation of their unborn baby from the very outset. Future studies would also benefit from including measures of parental mind-mindedness and reflective functioning, as another parental mediator between mental health and child outcomes.

This study's inclusion of both mothers and fathers enabled comparisons within couples of each parent's relative contribution to their infant's developmental outcome. However, a major limitation of the study was the small sample size, which limited the statistical power and increased the risk for Type II errors. Also, the small sample size restricted the types of analysis possible. Structural Equation Modelling (SEM) would have allowed for analysis of more complex interactional effects. The socially low risk sample of well-educated and co-habiting parents in the current sample may have protected the children from negative outcomes and may therefore have restricted the differences in developmental outcomes to be detected (e.g., Bronte-Tinkew et al., 2008). However, it could be argued that the homogenous sample controlled for socio-economical risk factors (e.g., Mensah and Kiernan, 2009) and therefore allowed for these factors to be excluded in the analyses, allowing the focus to be on the predictor variables of interest.

The small sample size also limited the number of predictor variables that could be included in the regressions. To minimize the number of predictors in the models whilst retaining maximal information, principal component analysis was used to provide a summary of groups of inter-correlated variables using unit weights. To reduce the predictor variables further, the current study also used a combined dyadic synchrony measure for the mother-infant interaction and one for the father-infant interaction,

despite rating these interactions on seven separate dimensions. It would have been beneficial to have examined whether these would have differential effects on the child developmental outcomes. This would be recommended in future larger scale studies.

Other methodological limitations include the retrospective measures of mental health variables in pregnancy, which could be subjected to recall biases. The study would also benefit from a long-term follow up of child developmental outcome, as earlier studies (Lung et al., 2009) have suggested that the impact of factors such as parental mental health may take time to emerge fully. Moderating effects of combinations of predictor variables on infant developmental outcomes may also benefit further investigations.

#### **6.5.6 Conclusions and implications**

In conclusion, the results of this study showed that parental perceptions of early characteristics of their infants may have an important role in predicting infant's cognitive, language and motor development. The negative impact of maternal postnatal PTSD on the infant's cognitive development is a new and important finding, which should be addressed in future research. Maternal prenatal depression was also significantly related to the infant's language development, whilst paternal mental health was mainly linked to the couple's relationship and father-baby relationship. Despite the parent-infant relationship being widely viewed as providing a mechanism by which poor parental mental health, child characteristics and the couple's relationship affect child development, no such mediation effect was found. However, the maternal perceptions of the mother-infant relationship showed a significant association with the infant's language development and paternal perceptions of the father-infant relationship with the infant's cognitive development.

Importantly it needs to be emphasised that the results of the current study should be considered as preliminary due to the small sample size. It would therefore be valuable for future research, with larger sample sizes, to use more sophisticated modelling techniques to more fully examine the complex interplay among these variables within family systems, over longer periods and in different socio demographic groups.

## **7 General Discussion of Thesis**

This thesis consists of five studies (Article 1 – 5) which cover different aspects of the transition to parenthood, mental health, family relationships and child development. They all took place within the Sussex Journey to Parenthood study, a prospective, longitudinal investigation of the transition to parenthood in first-time parents, using a variety of qualitative and quantitative methods. The previous chapters (2 – 6) have addressed the findings in relation to each specific aim. This final chapter starts with a summary of the combined findings which are discussed in relation to the two overall objectives of the thesis. This is followed by a discussion of the key practical and theoretical implications. Finally, methodological strengths and weaknesses are examined, together with suggestions for future research.

### **7.1 Summary of Combined Findings**

This section will consider how the combined findings from these articles fit together with each other, with previous literature and relevant theories and models, in relation to the two overall objectives of this thesis. These objectives were to; (i) gain a detailed description of men and women's transition to parenthood, in terms of their mental health and family relationships (ii) prospectively examine first-time parents' transition to parenthood in terms of how their pre and postpartum mental health, their relationship with their infant and as a couple, and their child's development, interrelate.

#### **7.1.1 Description of the transition to parenthood period**

Combined, this thesis showed that a proportion of both men and women experienced mental health problems, such as anxiety, depression and PTSD in the transition to parenthood period. In accordance with the diathesis-stress model, a number of vulnerability factors were found which were associated with statistically significantly

greater risk of postpartum mental health problems (Article 2). These included lack of postpartum partner support, complications during labour, sleep deprivation as well as parental feelings of unworthiness and parental anger.

Data from clinical interviews (Article 2) and self-report questionnaires (Article 3) suggested that the women in the study were more likely than the men to suffer from postpartum mental health problems, which is consistent with previous research (Correia & Linhares, 2007; Edhborg et al., 2005; Figueiredo & Conde, 2011; Ramchandani et al., 2005). With the exception of depression in pregnancy, within couple comparisons for the interview and questionnaire measures, showed no significant associations or comorbidity of mental health problems in the current sample, which is contrary to the findings of Iles et al. (2011).

The findings also indicated that the pregnancy period may be an especially vulnerable time, with both partners experiencing significantly higher levels of anxiety symptoms (Article 3) and more cases of anxiety (Article 2) compared to the postpartum period. This is comparable to findings in other studies (Buist et al., 2003; Heron et al., 2004; Wenzel et al., 2005). Combined rates or symptoms of anxiety and depression (Article 2 and 3) were higher in pregnancy compared to postpartum, which is also consistent with studies of the course of mental health during the transition to parenthood period (Andersson et al, 2006; Bretkopf et al., 2006; Buist et al., 2003; Condon et al., 2004). However, no significant changes between the pregnancy and postpartum period were evident with regards to severity or rates of symptoms of depression in the current sample. Similarly, the level of PTSD symptoms remained relatively unchanged across the postpartum period (Article 3).

The interview study (Article 2), found prevalence rates of depression in pregnancy and postpartum of approximately 10%, which concurs with rates found in other studies (Buist et al., 2008; Paulson & Bazemore, 2010; O'Hara & Swain, 1996). The results from Article 2 further indicated that in pregnancy both partners' anxiety rates (24% of women and 25% of men) were higher than rates of depression (11% of women and 8% of men), with women's anxiety rates (22%), also being higher than depression (11%), five months postpartum. The prospective questionnaire study (Article 3), showed a similar trend, with higher levels of anxiety symptoms compared to depressive symptoms at all three time-points. This pattern of anxiety being more prevalent than depression, especially in pregnancy, has also been reported in other studies (Brockington, Macdonald, & Wainscott, 2006; Condon et al., 2004; Heron et al., 2004; Lee et al., 2007; Matthey et al., 2003). However, it needs to be highlighted that high comorbidity of anxiety, depression and PTSD existed in the current sample in both men and women (Article 2 and 5). This replicates previous research (Czarnocka & Slade, 2000; Figueiredo & Conde, 2011; Parfitt & Ayers, 2009; Wenzel et al. 2005; White et al., 2006) and has led some researchers (Matthey et al., 2003) to suggest that a combined term of "postnatal mood disorder", which incorporates both depression and anxiety, could be an alternative to diagnostically separating these disorders.

Other common problems reported by parents in the interviews during the early postpartum months included sleep deprivation (60%) and physical discomfort and body dissatisfaction amongst approximately one-third of mothers. Nevertheless, it should be noted that despite many parents reporting mental health and other difficulties in the transition to parenthood, most parents generally experienced this period positively. For example, positive mental health in pregnancy was reported by 61% of parents and by 58% in the postpartum period, and more than half of the parents specifically mentioned

the positive aspects of parenthood with experiences of enjoyment, fulfillment and reward (Article 1). This coincides with increasing literature showing personal growth following birth (Sawyer & Ayers, 2009). From a diathesis-stress model perspective, the socially low risk sample of well-educated and co-habiting parents in the current study may thus serve as protective factors for the development of mental health and instead contribute to parents' positive mental health.

The joint findings from parental interviews, self-report questionnaires and observations of parent-infant interactions indicated that many parents, even within this relatively privileged sample of well-educated couples, struggled with regards to developing their relationship with their baby. For example, interview data (Articles 1 and 2) showed that a high proportion of parents (27%) reported feelings of anger towards their baby. Observational data of parent-infant interactions at 3 months postpartum also gave evidence of “inept” or “at risk” parenting, with 34% of the mother-infant dyads and 20% of father-infant dyads being assigned to these categories. These figures are comparable to another observational study of a community sample of mothers and their infant (Flykt et al., 2010). No overall gender differences were found for any of the different types of parent-infant measures (Article 1, 2, 3 or 4). Instead, the mother-father correlations revealed many significant associations (Article 2 and 3), which is broadly in line with current research (Barnett, Deng, Mills-Koon, Willoughby & Cox, 2008; Ryan et al., 2006).

Klaus and Kennel's (1976) bonding theory suggested that the first hours and days after birth were crucial for the development of a satisfactory parent-infant bond. However, literature is sparse with regards to the timing of parental bonding, with very few studies considering this (Muzik et al., 2013; Robson & Moss, 1970). In relation to timing and formation of the parent-infant relationship, the interview data (Article 2)

suggested that the mean onset of positive feelings for the baby was 2.5 weeks (*SD* 4.1; range 0 – 20 weeks), with 40% reporting an “instant falling in love”, whilst the remainder of parents had initial feelings of ambivalence. Parents’ accounts especially highlighted the importance of the baby’s smile for this relationship to develop (Article 1). This is in line with the DMM model which highlights the active role that the infant plays in the development of the dyadic parent-infant relationship formation. Other details from the interviews (Article 1 & 2) revealed that some parents (19%) experienced problems with interaction and bonding with their baby in pregnancy and that, whilst most parents felt an extreme joy and pride when first seeing their new born baby, 20% of parents (30% of women and 10% of men) reported initially experiencing a negative reaction to their baby. Questionnaire data (Article 3) showed a small but non-significant improvement of the quality of parent-baby bond across time (from 3 months to 15 months postpartum) for both men and women.

The quality of the couple’s relationship was assessed by self-report questionnaires (Article 3) and parental interviews (Articles 1 & 2) and showed that within-couple concordance rates were high with no significant differences between mothers and fathers. The questionnaire measures showed that the quality of the couple’s relationship was significantly lower at 15 months postpartum than in pregnancy, for both men and women. The interviews reflected a similar pattern, with more parents experiencing poor partner relationship and support in the postpartum period compared to during pregnancy. Also, the interviews revealed that the couple’s sexual relationship appeared to suffer both in pregnancy and postpartum, with as many as 78% of parents experiencing sexual relationship problems at 5 months postpartum. Half of the parents (51%) had not yet resumed their usual sexual relationship at this time point. These findings give further support to previous literature regarding evidence of a reduction in



relationship satisfaction and negative changes in sexual relations within couples following childbirth (Bateman & Bharj, 2009; Dixon, Booth & Powell, 2000).

Two parental self-report measures of the infant's temperament were collected, one at three months and the other at 15 months postpartum (Article 3). Parents' reports of the infant's temperament were shown to improve with time, with a significantly less infant difficulty reported at 15 months compared to three months postpartum. Researchers generally view infant temperament as relatively stable (Canals et al., 2011), but in dynamic interaction with the child rearing context (e.g., parental caregiving) across time as suggested by the transactional model of child development (Sameroff et al., 2004). Most researchers agree that there is a transactional interaction between the parent and child (e.g., Pesonen et al., 2008). For example, van den Boom (1994) found that parenting interventions to improve maternal sensitive responsiveness, not only increased mother-infant attachment but also made the infants' temperament easier.

Interview measures (Article 2) suggested that around 28% of parents experienced their baby's temperament as "difficult" at five months postpartum. No significant differences were found between mothers and fathers with regards to these measures, and within-couple correlations were substantial. Most parental descriptive accounts (Article 1) of their child's characteristics and temperament were positive (97%), with frequent references to social descriptions (e.g., "she is very smiley and engaged"). However, many parents (58%) also described their baby in terms of negative characteristics, such as "he seemed too passive" or negatively compared their baby to other babies, saying things like "he doesn't smile as much as other babies". These negative attributions may be influenced by the parents' own internal working model of earlier relationships, as suggested by the attachment theory.

The final article in the present thesis (Article 5) examined results from the infant developmental assessments at 17 months postpartum. Descriptive information indicated that, as a sample, the infants' developmental and composite scores were within normal limits. This was the only time point where an assessment of the child's development was carried out. However, many parents commented on their baby's development in their interviews (Article 1). Common themes were the baby's motor (95%) and social development (94%), with comments such as "he loves being on his two feet" and "when he started smiling, he became a little person".

In summary, the combined qualitative and quantitative findings related to the first objective of describing parental experiences of their transition to parenthood in terms of parental, infant and relationship factors concurred with each other. Parental experiences of anxiety were especially common, and pregnancy mental health problems were more frequent than postpartum problems. Overall, significantly more women experienced mental health problems compared to men. A relatively high proportion of parents experienced and displayed less than optimal parent-infant interactions and the quality of the couple's relationship decreased with time, whilst infant characteristics and the parent-baby bond improved with time. Infant development for the sample was within normal limits. Within couples, mothers' and fathers' experiences of their relationship as a couple as well as with their infant and their reports of the infant characteristics were quite similar to one another.

### **7.1.2 Associations between parental, infant and family relationship factors**

The second overall objective of this thesis was to prospectively examine the associations between parental mental health, family relationships, infant characteristics and the infant's development. This section will present the combined findings of these associations, with specific focus on the impact of parental mental health and other

constructs on the two main outcomes, which were the parent-infant relationship and the infant's development. Self-report measures of the quality of the parent-baby bond (Article 3), parental verbal accounts of their relationship with their baby (Article 1 & 2) and observations of the parent-infant interactions (Article 4) provided multiple measures of the parent-infant relationship. An infant developmental assessment provided details of infant developmental outcomes (Article 5). The common objective was to prospectively examine associations between parental mental health, the parent-infant relationship and the infant's development, and also to include additional predictors, as suggested by Belsky's model of parenting (1984). This model provided a useful framework for the decisions of which main variables were included throughout the whole thesis.

A number of bi-directional associations were found between measures of parental mental health, parent-infant relationship, couple's relationship and infant characteristics. Paternal mental health, in particular, seemed to play an important role for the father-infant relationship (Article 3 & 4). For example, high levels of paternal affective symptoms (depression and anxiety combined) in men during pregnancy predicted father-infant interactive patterns of low paternal control and infant difficulty but high paternal unresponsiveness and infant passivity. An opposing pattern was found for paternal postpartum measures of PTSD and depression which were associated with higher levels of infant difficulty and lower passivity (Article 4). Evidence from Wilson and Durbin's meta-analysis (2010) similarly showed negative effects of paternal depression on men's parenting, with increased negative and decreased positive interactive behaviours.

Also maternal postnatal affective symptoms (depression and anxiety combined) showed signs of deleterious effects on the fathers by predicting higher paternal

unresponsiveness, a finding shared with Goodman (2008). Contrary to this, mothers seemed to compensate for poor mental health in pregnancy for men, with interactive patterns suggesting higher maternal sensitivity and infant cooperation. This is in line with Edhborg et al.'s observations (2003) that partners of mothers with depression “compensated” by optimizing their interactions with their babies. It also highlights the importance of studying the parent-infant relationship in the context of the family system as a whole and including both mothers and fathers in the analyses. Generally, fewer associations emerged for maternal mental health and the mother-infant relationship than for paternal mental health and father-infant relationship (Article 3, 4 and 5). For example, no significant associations were found between women's depressive symptoms in pregnancy or postpartum with any of the observed parent-infant interactions. However, maternal anxiety in pregnancy was associated with more maternal control, and less maternal unresponsiveness and infant passivity.

Apart from observed parent-infant interactive behaviours, the parent-baby bond was another parent-infant relationship outcome variable which was considered in the current thesis (Article 3). Parental self-reports suggested that the majority of parental mental health measures both in pregnancy and postpartum were associated with the parent-baby bond at three months and 15 months postpartum. As above, men's mental health symptoms appeared more strongly associated with the father- infant bond, than women's mental health symptoms with the mother-infant bond (Articles 3). This highlights the important role of fathers, especially as negative child outcomes such as externalizing behaviours may be a consequence of poor quality father-infant interactions (Ramchandani et al., 2013). Interestingly, the thematic analysis (Article 1) found that negative appraisal of parenting abilities and low self-efficacy were more common

amongst fathers than mothers, a finding similar to that of Hudson, Elek and Fleck (2001).

The thematic analysis (Article 1) further indicated that the presence of parental feelings of a bond was a theme that occurred significantly more frequently amongst parents not suffering from postpartum mental health problems. Also, the parental interviews revealed that a significantly higher percentage of parents with postpartum mental health problems experienced feelings of parental unworthiness and anger towards their baby (Article 2). The presence of parental anger, in particular, seemed to have a negative influence on the parent-infant relationship, as these parents' verbal accounts more frequently included negative descriptions of their baby, a lack of mind-mindedness, impulses to harm their baby and lack of love for their newborn (Article 1). In relation to these results, Mammen et al.'s research (2000) showed that parental experiences of anger played a crucial role as a mediator between parental mental health and actual aggressive behavior towards their baby.

This thesis gave evidence of the important contribution of parental perceptions of their infant's temperament/characteristics to the parent-baby relationship (Article 3 and 5). For example, parental self-report measures of difficult infant temperament were associated with a less optimal parent-infant bond, both early and later postpartum. This is in line with previous research which has found links between less optimal mother-infant relationship and difficult infant temperament (Mantymaa, Puura, et al., 2006). Researchers have, for example, suggested that the infant's difficult temperament may induce a vicious circle of mutual rejection within the parent-infant relationship (Campbell et al., 1995; Field, 1995). However, it should be acknowledged that the association between infant difficult temperament and a less optimal parent-child relationship may be a result of parental attributions and subjective perceptions.

Additionally, this thesis suggested that the quality of the couple's relationship during pregnancy was associated with, and an important predictor of the parent-baby bond, both early and later postpartum (Article 3). This has been acknowledged in several other studies regarding "spillover" effects between the quality of the couple's relationship in pregnancy and the subsequent parent-baby relationship (e.g., Favez, Frascarolo & Fivaz-Depeursinge, 2006; Florsheim & Smith, 2005) and further highlights the importance of viewing the family as a system (e.g., Erel & Burman, 1995).

The parental capacity to mentalize (i.e., to understand their infant's behaviours in terms of the infant's mental state) and to be mind-minded (to view the infant as an individual with a mind) are suggested as other potential protectors of the development of secure parent-infant attachment patterns and to help explain the trans-generational transmission of attachment patterns (Fonagy & Target, 1997; 2005; Meins et. al, 2003; Slade, Grienemberger, Bernbach, Levy & Locker, 2005). These concepts may thus also be useful to consider in relation to findings that show a link between negative parental narratives and representations and mother-infant relational behaviour. For example, Dollberg et al. (2010), found associations between negative maternal representations of their baby and hostile interactive behavior toward their baby, which may have important long-term implications. These findings are worrying, especially when considering the importance of the early parent-infant interaction for laying the foundations of the infant's future development (Murray, FioriCowley et al., 1996).

The final chapter (Article 5) brought all of the study variables of interest together to focus on the infant's developmental outcomes, using Belsky's model as a general framework to inform the analyses. The finding that maternal depression in pregnancy was associated with less optimal language development replicates results

from other studies (Evans et al., 2012) which similarly suggest that prenatal exposure to maternal depression may be particularly predictive and detrimental to child developmental outcomes, through adverse neurophysiological effects on the fetus. A novel finding was the significant association of maternal PTSD on the infant's cognitive development. A possible reason for this, could be that mothers with PTSD potentially avoid contact and play with their baby (Nicholls & Ayers, 2007), limiting their infant's exposure to inferential learning, similarly to mothers with postnatal depression (Hay et al., 2001). However, this is purely speculative at this stage and requires further research.

The finding that interview measures of the mother-infant relationship were associated with the infant's language development and the interview measure of the father-infant relationship was associated with the infant's motor development, whilst the observed parent-infant interactions were not associated with any of the infant's developmental outcomes needs further exploration. Explanations for this may be that the interview captured the parents' internal working model of their relationship to a greater extent than the interactional measure, and as such may have a more lasting effect on the infant's development (Flykt et al., 2010).

The infant characteristic measure, derived from parental perceptions of their infant's temperament turned out to be the most important predictor for all three assessed developmental areas (cognitive, language and motor). This finding supports Belsky's model (1984) and recent empirical studies that have also found direct links between negative parental perceptions of their infant's temperament and less optimal infant development (Hernandez- Martinez et al., 2011; Molfese et al. 2010) and behaviour problems (Dale et al., 2011). Researchers have suggested that it may be the combined effect of infant irritability and parental mental health which is detrimental to child developmental and behavioural outcomes (Black et al., 2007; Jessee, Mangelsdorf,

Shigeto & Wong, 2012), not just one or the other. In relation to this, the findings of this thesis suggested that parental mental health and infant characteristics are associated. For example, in the self-report study (Article 3), both father and mother reports of infant temperament were significantly correlated with the majority of concurrent mental health measures (anxiety, depression and PTSD). Similarly, some of the mental health measures and the infant characteristic factor derived from the parental interviews were correlated (Articles 2 & 5).

Contrary to evidence from previous studies (Murray, FioriCowley et al., 1996; Ramchandi et al., 2005), neither maternal nor paternal postnatal depression was significantly associated with child developmental outcomes. One explanation for not finding these links could be that any negative effects from poor mental health may take much longer to become apparent (Lung, Chiang, Lin & Shu, 2009). Also, the current thesis assessed the infant's cognitive, language and motor development, not the infant's behavioural or emotional outcomes from self-report measures, which has been the case in other studies (e.g., Ramchandani et al., 2005).

To sum up, the findings related to the main objectives of this thesis indicate that there are multiple factors that influence the parent-infant relationship and the child's development, with many bi-directional associations between parental mental health, infant and relationship variables. Parental perceptions of their infant's characteristics may have a key role to play, both regarding links with the parent-infant relationship and also in predicting child developmental outcomes. This is in line with Belsky's model (1984), which suggests that infant characteristics and the parent-infant relationship have direct influences on the child's development.



## **7.2 Key Practical and Theoretical Implications**

The findings of the current thesis have several theoretical and practical implications. Specific implications are discussed in more detail within each chapter (Article 1 to 5). The following section gives examples of some of the key practical and theoretical implications resulting from the current thesis.

This thesis suggests that mental health problems are more common in pregnancy than postpartum, for both men and women. This points to the necessity of assessing mental health and providing early support to parents during pregnancy. The thesis also suggests that both parents experience higher anxiety rates than depression rates in pregnancy and that this is also the case for women in the postpartum period. This highlights the importance of moving beyond depression in screening programs and future research. Although comorbidity and overlap of symptoms are common, it is important for clinicians to be aware that these different diagnoses may need to be treated differently. For example, treatment methods for PTSD may involve specific techniques, such as eye movement desensitization and reprocessing (EMDR; Sandstrom, Wiberg, Wikman, Willman & Hogberg, 2008), whilst severe depression may benefit from pharmacological treatment (e.g., Anderson & Maes, 2013).

Fathers in the current study suffered from mental health problems in the perinatal period, albeit to a lesser extent than the mothers. Most important, it appeared that poor mental health in fathers may have a greater negative effect on the father-infant relationship than is the case for mothers. Fathers were also negatively affected by poor mental health in the mother when interacting with their infants. These results imply that it is crucial to support and include fathers in interventions and research during their transition to parenthood (Fletcher, 2009; Fletcher, Feeman, Garfield & Vimpani, 2011).

Additionally, in line with studies supporting the family systems perspectives (Erel & Burman, 1995; Favez et al., 2006), both fathers' and mothers' quality of partner relationship in pregnancy was associated with their bonding to their baby in early postpartum, and also later postpartum for fathers. This further implies that fathers should routinely be included in future empirical studies and interventions. Also, fathers' quality of interaction with their infant appeared to be negatively affected by mental health problems in the mother. This shows the importance of treating the family as a system, with dynamic interactions between both parents and their baby and their possible deleterious effects on each other. Furthermore, the couple's relationship quality decreased with time emphasizing the need of early interventions aimed at strengthening the couple's relationship.

Apart from the main variables of interest in this thesis, a few other less researched aspects of the transition of parenthood and mental health were highlighted. For example, the presence of parental feelings of anger was found to be relatively common, and had a significant influence on how the parents viewed their baby and how they experienced their transition to parenthood. Parental anger was specifically linked to parents' experiencing problems in understanding their baby – a possible lack of mind mindedness (Meins, Fernyhough, Fradley & Tuckey, 2001; Meins et al., 2003), negative descriptions of their baby, lack of love and impulses to harm their baby. Clinicians and researchers recognize that hostile parental behavior may be associated with parental mental health (Mammen et al., 2000; Mantymaa, Puura, Luoma, Salmelin & Tamminen, 2004). However, the potential role of parental anger as a mechanism by which parental mental health and infant outcomes are linked should be explored further, both theoretically and empirically. Giving new parents the opportunity to talk about their negative and positive experiences of parenthood, including feelings of anger and

delayed feelings of love, could enable them to normalize and reflect on these experiences, and to develop mind-mindedness.

Additionally, the thesis draws attention to the importance of parental internal mental representations of their baby, themselves and their relationship. The findings provide some tentative evidence that internal representations of the relationship with their baby can have more bearing on child outcomes than the actual parent-baby interactions. This is another area that needs further investigations and could be a target for clinical interventions. In support of this, Barlow (2012) emphasized that pregnancy and the first postpartum year presents a “window of opportunity” where interventions aimed at parental internal mental representations may be especially effective in preventing child maltreatment and neglect. Early interventions may thus benefit from including ways to encourage parents to view their baby positively, especially as research indicates that negative parental representations of the baby, both in pregnancy and early postpartum, can have negative effects on subsequent parent-infant interaction (Brockington, Aucamp & Fraser, 2006; Dollberg et al., 2010), infant developmental outcomes, temperament and behavioural outcomes (Forman et al., 2007; Hernandez – Martinez et al., 2011).

The active role of the infant, both in the formation of the dyadic relationship with the parent, and in the infant’s own development was highlighted, as the interview measure of infant characteristics was a key predictor of child developmental outcomes, and the infant temperament questionnaire measure was predictive of the parent-infant bond. This implies that every effort should be made to help parents cope with and understand their infant’s “difficult temperament” and also, as suggested above, help alleviating any negative parental perceptions of their infant’s characteristics. This should be implemented regardless of whether the “difficult temperament” is a result of

parent to child effect (Hanington et al., 2010), vice versa, or a transactional development with bi-directional effects (Pesonen et al., 2008) or due to a poor “goodness of fit” (Belsky, 1984) between the parent and infant.

Difficult infant temperament should be considered as a potential risk factor for later developmental problems and therefore should be a target for intervention and routinely included in future child developmental studies. Alternatively, as mentioned above, interventions targeting parental sensitivity, may also lead to temperamentally easier children (e.g., van den Boom, 1994). Future research would also benefit from including additional methods for measuring infant temperament in order to clarify the direction further.

Many parents experienced parent-infant relationship problems and these did not solely occur in parents suffering from mental health issues. This supports the requests from many experts to view parent-infant relationship difficulties as a separate, but related disorder to parent mental health (e.g., Brockington, Aucamp & Fraser, 2006; Condon, 2010; Forman et al., 2007). There are some important clinical implications of whether parent-infant relationship disorders are viewed as part of, or separate from, mental health. For example, parent-infant relationship disorders may benefit from specific treatment approaches, such as baby massage (Onozawa et al., 2001) or parent-infant psychotherapy (Baradon, 2005; Jones, 2006; Willheim, 2013), especially as Forman et al., (2007) suggested that treating parental mental health alone is not enough to improve child outcomes.

In summary, the combined findings from the present thesis imply that screening and clinical interventions aimed at minimizing risks and promoting well-being for parents and their infants during the transition to parenthood period should; start early -

preferably in pregnancy, include fathers and mothers, focus on both the couple's and the parent-infant relationship in addition to parental mental health and consider the parents' internal mental representations of their baby as well as their relationship with the baby. The findings also imply that there are a multitude of parental, infant and relationship factors that dynamically interact with each other over time. Alongside the methodological discussion below, suggestions for future research are detailed.

### **7.3 Methodological Issues and Future Directions**

Methodological strengths and limitations related to specific parts of this thesis have been discussed within each article. This section will summarize these and also address the most important methodological issues for the thesis as a whole together with recommendations for future research, starting with highlighting some of the methodological strengths.

Firstly, this thesis benefitted from a mixed method approach by including quantitative self-report questionnaire measures (Article 3) as well as qualitative measures, such as clinical interviews (Article 1 & 2), observations (Article 4) and developmental assessments (Article 5). As discussed above, in general, similar patterns of findings across the methods emerged, which to a certain extent validates the data from multiple sources. However, strict triangulation with a statistical assessment of the extent to which the findings from the different measures converged was not conducted within the bounds of this thesis. There is an ongoing debate amongst researchers regarding the feasibility or desirability of strict triangulation (for a methodological review, see Ostlund, Kidd, Wengstrom & Rowa-Dewar, 2011), which concluded that the main benefits are that it can increase the understanding of the links between theory and empirical findings.

Advantages with using measures such as face-to face interviews and observations in addition to self-report questionnaires have been acknowledged (Pawlby, Sharp, Hay & O’Keane, 2008). The consistency and objectivity of ratings are, for example, helped by the fact that the same researcher judges the whole sample, instead of relying on individual participants, who may be affected by demand characteristics, mood and other subjective factors which may influence their ratings on the self-report scales differently from person to person. For example, Paulson and Bazemore (2010) found that self-report questionnaires generally produce higher overall mental health prevalence rates, compared to interviews. Also, the in-depth interviews, which focused on the individual’s experiences, highlighted other important influencing factors that would need further exploration in future research, such as parental anger and perceptions of their baby. Future studies would also benefit from including direct separate observations and ratings of the infant’s temperament in addition to dyadic relationship ratings.

Another main strength of this study was that both first-time mothers and fathers were included. This facilitated within-couple and mother/father comparisons. This was particularly relevant in Article 5, where parents’ relative contributions to child development were considered. This is an important addition, as research including fathers is still sparse. This approach is also in line with the family systems perspective, which acknowledges the importance of including fathers, and looking at the family as a whole.

Thirdly, the prospective, longitudinal design enabled comparisons of parental mental health and relationship variables across the transition to parenthood, including late pregnancy (Article 3, 4 & 5). This is a particularly pertinent contribution to current literature, as there is limited evidence regarding the time course of parental mental

health in relation to the development of the parent-baby bond over time. A recent similar study (Muzik et al., 2013) followed the trajectory of bonding and mental health in mothers up to 6 months postpartum, whilst the range of the current thesis extended to 15 months postpartum. Future prospective designs would also benefit from including a measure of parental mental health pre-pregnancy, which was not included within the current thesis. Although the current thesis mainly focused on associations between variables, the prospective design permitted some tentative indications of temporal relationships between variables. For example, the couple's relationship in pregnancy predicted the parent-baby bond at three months postpartum. However, caution should be taken with regards to the issue of causality because of the correlational, though longitudinal, design.

The thesis research was guided in part by Belsky's determinants of parenting model (1984) and also benefitted from including assessments of the couple's relationship and infant characteristics in addition to parental mental health and the parent-infant relationship. This enabled the study of joint effects and associations between these and child developmental outcomes. I am unaware of any previous study that has included all of these variables in the same model. A final advantage of the current thesis was the inclusion of PTSD and anxiety measures, whereas previous research has focused on postnatal depression (e.g., Beck, 1998; Murray & Cooper, 1996; Murray, 2009; Quevedo et al., 2012).

There are also a number of methodological limitations of the studies included in the current thesis. A major limitation is the small sample size, which was due to difficulties recruiting couples, especially fathers, and attrition of participants over time points. This has several implications on the type of statistical analyses conducted. Structural equation modeling (SEM) would have been the preferred statistical procedure

for analyzing the associations and interactions between the study variables across time, especially in articles 3 and 5. However, the sample size did not allow for SEM to be performed. Although the appropriate definition of adequate sample size for SEM is debated, rules of thumb that have been proposed include a minimum of 200 participants or 10 to 20 times more observations than variables (Hoe, 2008). SEM analyses would have allowed for a simultaneous examination of several multi-level associations between the variables. The Actor-partner-interdependence models (APIM; Cook & Kenny, 2005) may also be a useful addition to future studies of the interdependence of the variables within the family. It would therefore be valuable for future research with larger sample sizes to use these more sophisticated modeling techniques to capture more fully the complex interplay amongst variables within family systems.

An implication of the small sample was that statistical power was reduced for the studies within the thesis. The research was only sufficiently powered to identify medium or large effects. This increased the risk of Type II errors, where the analyses failed to find an effect when there was one. In contrast, multiple tests on a small sample could increase the risk of Type I error, with reporting of an effect when there wasn't one. In this thesis, tests to correct for Type I error, such as Bonferroni corrections, were not applied in all analyses because this would have further added to the risk of Type II errors. Instead, where possible, effect sizes were reported. Additionally, conservative methods for analyzing correlations were used (Spearman's rank order).

The restrictions imposed by the small sample size resulted in a tension regarding how to best analyze and present the data. A compromise was reached where parents were treated as individuals in the parts of the thesis that looked at individual outcomes such as parental mental health and experiences of parenthood in general (Article 1, 2 and 3). In the parts of the thesis that looked at family outcomes, such as the parent-baby



relationship and child development, families were treated as the unit of analysis to consider the couples' joint influences (Article 4 & 5). The decision to treat parents as individuals in the first part of the thesis was based on the fact that the aims for these chapters were mainly descriptive and treating parents as individuals countered some of the difficulties with the small sample size. An additional defense for this decision was that the findings indicated that there was no significant concordance of mental health issues within the couples.

Another methodological issue was the socially low risk sample, consisting predominantly of well-educated, white European, older, co-habiting parents, who may have been biased towards greater motivation for parenting (e.g., Edhborg et al., 2003). This limits the generalizability of the findings, which should therefore be interpreted with caution. For example, the low risk sample may have increased the likelihood of "floor effects" with low mental health scores, which could have limited the explorations of the relationships between variables. However, there is an alternative argument that a low risk homogenous sample in itself controls for socio-economic factors (Mensah & Kiernan, 2009), which allows for these to be excluded in analyses and enables the focus to stay on the variables of interest. Future recommendations would be to extend the recruitment to other socio demographic groups and more representative samples, including more vulnerable groups of parents.

A final methodological consideration is the use of the Birmingham Interview for Maternal Mental Health. Although this was designed to examine mothers' transition to parenthood it is not a diagnostic interview and has not been validated for use with fathers. Full assessment of mental health diagnoses in terms of DSM criteria requires a clinical mental health interview (e.g., Spitzer, Williams, Gibbon & First, 1989) designed for this purpose. Another disadvantage was that parent's accounts of pregnancy and

birth experiences were retrospective, as the interview was conducted approximately five months postpartum. These may therefore have been subject to recall biases. For future studies, it would be useful to use the pregnancy section of the interview concurrently rather than retrospectively, and to adjust some of the questions to be applicable to fathers. Another suggestion for the future would be to develop a shorter version of the interview, which would be more practical in clinical settings with time constraints.

The findings from this thesis tentatively suggest that the timing of mental health may be important to the parent-infant relationship and infant developmental outcomes, with differential effects of pregnancy and postpartum mental health problems. The use of a combined “chronicity” measure of pregnancy and postpartum mental health problems was initially considered. However, as differential effects between pregnancy and postpartum mental health were of interest it was decided to analyze these separately within this thesis. Future studies would benefit from examining these differential effects further, and also including analysis of additive effects and chronicity of pre-pregnancy, pregnancy and postpartum mental health on the parent-baby relationship and child outcomes in more detail. Some researchers (Grace et al., 2003; Quevedo et al., 2012) suggest that it is the chronicity rather than mental health problems per se that leads to negative long-term implications for infant outcomes. In relation to the timing of measures, some researchers have found that significant links between parental mental health and infant developmental outcomes don’t appear until later on in childhood (Fletcher et al., 2011; Lung et al., 2009). Therefore it is important for future studies, and potentially as an extension of the present thesis, to conduct long-term follow ups of the child’s development and parental mental health.

It would also have been ideal to have included an assessment of the infant’s development, or alternatively a parental questionnaire regarding the child’s

development, in the first few weeks postpartum. This would have enabled a full analysis of the trajectory of the infant's development from birth. Pregnancy measures of parental expectations of their unborn baby's development, as well as their bonding to their unborn baby, would further add to research concerning trajectories over time. Adverse effects on infant outcomes from interactional and moderation effects between several factors also need further attention. For example, recent research shows adverse moderating effects of poor parental mental health and "difficult" infant temperament on infant behavioural outcomes (Jessee et al., 2012). Parental attachment style has been suggested be another important moderator (Flykt et al., 2010) for the relationship between parental mental health and parent-infant interaction.

Additionally, when examining the links between parental mental health and parent-infant relationship and subsequent infant developmental outcomes, researchers need to be aware that it may be very specific aspects of each of these areas that are related to each other, rather than global aspects. For example, Murray, FioriCowley, et al. (1996) found that it was infant directed speech that specifically predicted the child's cognitive development, and that hostile parental behaviour was particularly damaging to the child's cognitive processes (e.g., Murray, 2009). This thesis highlighted the potential importance of certain aspects related to the parental mental health and the parent-baby relationship, such as anger and negative parental perceptions. Future studies would particularly benefit from exploring the effects of anger through a variety of qualitative and quantitative measures in pregnancy and the early postpartum period, both for research and interventional purposes.

One of the main challenges with this thesis was the decision of which variables to focus on in relation to parental mental health, the parent-infant relationship and child outcomes. Belsky's determinants of parenting model (1984), was used to guide these

choices, although this model was not formally tested as such. It should be acknowledged that the variables included within this thesis were only a selection of many other potential variables that equally well could have been included, especially if the sample size had allowed. There are, for example, more comprehensive ecological models such as Bronfenbrenner's ecological theory of development (1979, 1986) which include broader social and cultural influences. In addressing the family systems perspective, the parents' influence on each other and jointly as a couple was considered to some extent with regards to their interactions with their infant and their child's development. However, unlike Frosch, McHale and Mangelsdorf (2000), any triadic co-parental interactions and influences were not included within the realms of this thesis. Triadic family interactions in relation to parental mental health would therefore be a useful addition to future research.

Finally, it should also be noted that in the present thesis, the researcher was an integral part of the research process from the design to interpretations of results, particularly with regards to the interviews and thematic analysis, which by their very nature are subjective. Therefore it is necessary to reflect on and acknowledge that the researcher's own biases, experiences and perceptions were inextricably linked to the results. However, care was taken to limit any researcher biases or inaccuracies by using other raters and checking for inter-rater reliability in the qualitative parts of the study (article 1, 2 and 4). Generally, frequent discussions between the researcher and the supervisors throughout the research process further enabled a reflexive stance to be taken by the researcher. However, common to all research, it is inevitable that a range of the methodological issues and decisions regarding the design, sample, type and timing of measures, analyses and interpretations ultimately affect the findings.

Ethical considerations were taken at every stage of the study regarding confidentiality, anonymity, provision of information and debriefing. During the visits to the participants' homes, where the interviews, observations and assessments took place, the researcher took a close, confidential, non-judgemental approach. The great majority of parents especially commented on these visits as being positive and therapeutic. It is also important to be aware that these interviews in themselves may have acted as a form of intervention that changed the course of the parent's behaviours and experiences, and thus potentially influenced the subsequent findings.

#### **7.4 Conclusion**

In conclusion, the studies within this thesis have contributed to our knowledge of the transition to parenthood in several ways. The thesis particularly addressed a number of gaps in the current literature by including first-time fathers as well as mothers, using a prospective, longitudinal design, considering both pregnancy and postpartum mental health conditions - PTSD and anxiety - in addition to depression, and exploring these in association with family relationship quality and infant developmental outcomes. Additionally, the thesis benefitted from the use of a range of quantitative and qualitative methods, including self-report questionnaires, semi-structured interviews, detailed observations and developmental assessments.

The findings indicated that mental health problems occur amongst men and women, both in pregnancy and postpartum, with anxiety being more prevalent than depression. Also, pregnancy appeared to be a more vulnerable time for mental health problems than the postpartum period. Many parents also experienced less optimal parent-infant relationships, including feelings of anger towards their infant and negative perceptions of the infant. Very few overall mother/father differences were found, apart from mothers being more likely to suffer from mental health problems than fathers.

The findings further suggested a number of bi-directional associations between the measures of parental mental health, parent-infant relationship, couple relationship and infant characteristics. Fathers' mental health seemed to be particularly associated with their relationship to their infant and their partner. The mother's mental health also showed some associations with her interactions and relationship with her infant. Additionally, maternal postpartum PTSD was associated with the infant's cognitive development and maternal depression in pregnancy with the infant's language development. However, the parents' perceptions of their infant's characteristics derived from the parental interviews was shown to have the largest impact on the infant's cognitive, language and motor developmental outcomes. Also, parents' self-report measures of infant characteristics were significant predictors for the self-reported parent-baby bond, both at three months and 15 months postpartum.

The combined findings from this thesis highlight the importance of clinical interventions starting in pregnancy, including both mothers and fathers, considering the parent-infant relationship and couple's relationship in addition to mental health, and of addressing parental internal representations of their infant's temperament/characteristics and the parent-infant relationship. However, methodological issues, such as the small and homogenous sample, limit the types of analyses that could be carried out, the number of variables included and the generalizability of these findings. The results should therefore be considered as preliminary and explorative. Future research would benefit from prospectively examining the links between these variables further, with larger samples of parents and extended to other socio-demographic groups, in order to enable the application of more sophisticated statistical analyses and to test if the findings are generalizable to other socio-demographic groups.

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**APPENDICES**

## Appendix A: Thematic coding system for interviews (Article 1)

<b>Label</b> (i.e., a name) a. conceptually meaningful b. clear and concise c. close to the data	<b>Definition of what theme concerns</b> (i.e., the characteristic or issue constituting the theme)	<b>Description of how to know when the theme occurs</b> (i.e., indicator on how to “flag” the theme)	Description of any <b>qualifications</b> or <b>exclusions</b> to the identification of the theme	<b>Examples, both positive</b> (what to include) and <b>negative</b> (what not to include) to eliminate possible confusion when looking for the theme
<b>I. INFANT</b>				
<b>1.CHARACTERISTICS</b>				
<b>Positive infant characteristics</b>	Specific mention of positive characteristics in infant.	Mention of positive attributions when describing or talking about infant e.g., happy, content, smiley, cute	<b>Include:</b> Any positive comment about infant <b>Exclude:</b> Any negative comment about infant	<b>Positive</b> “Yes, he is playful and extremely cute, boisterous, funny, charming. He has got lots of personality already. Lots of energy. He is just very beautiful. I think he is beautiful.” <b>Negative</b> “I think she has got a terrible temper.” “I just cannot believe what cry monkey he is.”
<b>Negative infant characteristics</b>	Specific mention of negative characteristics in infant	Mention of negative attributions when describing or talking about infant e.g., terrible temper, alien, cry monkey, irritable	<b>Include:</b> Any negative comment about infant <b>Exclude:</b> Any positive comment about infant	<b>Positive</b> “I think she has got a terrible temper”. “I just cannot believe what cry monkey he is.”  <b>Negative</b> “Yes, he is playful and extremely cute, boisterous, funny, charming. He has got lots of personality already. Lots of energy. He is just very beautiful. I think he is beautiful.”
<b>Physical description</b>	Description of any physical features of infant	Comments (either positive or negative) concerning any part of the infant’s body e.g., eyes, toes, size	<b>Include:</b> tall, big, small, strong, healthy <b>Exclude:</b> Character descriptions	<b>Positive</b> “She is one foot tall. She is a bit taller than that. She has got the cutest eyes and the biggest toes.”  <b>Negative</b> “he is playful and extremely cute, boisterous, funny, charming. He has got lots of personality already. Lots of energy.”
<b>Characteristics from self/partner</b>	Referral to characteristics related to self or partner or other close relative	Mention of any presence or absence of infant characteristics in relation to self/partner/close relative e.g., just like me, a temper like her mother/grand father	<b>Include:</b> Self, partner, close relative <b>Exclude:</b> Comparison with other non-related babies or people in general	<b>Positive</b> “I think that she has got a cross between me and her mother. That makes her dangerous.” <b>Negative</b> “He is quite a happy baby. Not one of those always happy babies.”
<b>Social descriptions</b>	Description of any social characteristics in baby	Comments (positive or negative) about the infant’s social behaviour and interaction with others	<b>Include:</b> interacts, contact, smiles at etc	<b>Positive</b> “she’s good with other people generally” “He interacts a lot”
<b>2.BEHAVIOUR /NEEDS</b>				
<b>Crying</b>	Any referral to crying	Mention of presence or absence	<b>Include:</b> crying, sobbing,	<b>Positive</b> “There was a time where she was crying and inconsolable”

	behaviour in infant.	any infant crying behaviour in the present or the past.	screaming, moaning and other negative emotions <b>Exclude:</b> Other behaviours or comments e.g., laughing, making noises, being difficult, crazy. Parental “crying” behaviours	<b>Negative</b> “He suddenly just went crazy”
<b>Feeding</b>	Any referral to infant’s feeding (breast, bottle or solids)	Mention of feeding behaviours or utensils (bottle, spoon) in infant in the present or the past, positive or negative experiences	<b>Include:</b> breast feeding, bottle, solids, eating <b>Exclude:</b> Parent’s own eating	<b>Positive</b> “she wasn’t feeding properly. She wouldn’t latch on. he doesn’t breastfeed for comfort.” <b>Negative</b> “I didn’t have time to eat lunch”
<b>Sleeping</b>	Any comments directly related to the infant’s sleeping behaviour	Mention of sleeping behaviours or routines.	<b>Include:</b> sleeping, nap, resting, wake up <b>Exclude:</b> any other behaviours in baby. Sleep related to parents e.g sleep deprivation, tiredness	<b>Positive</b> “And he didn’t sleep much in the day on his own until recently and he’s been sleeping, having more naps.” <b>Negative</b> “I think only when we went through the really difficult sleep deprivation”
<b>3. DEVELOPMENT</b>				
<b>Motor Development</b>	Specific description of infant’s gross and fine motor development	Mentioning of presence of or absence of any gross or fine motor abilities such as rolling, sitting, standing, grasping. Also include body functioning (e.g., teething)	<b>Include:</b> rolling, sitting, crawling, standing, grasping <b>Exclude:</b> Development related to other areas e.g., cognitive or language Pure description of physical features or physical play	<b>Positive</b> “She rolls by herself”. “She lifts her bottom up”. <b>Negative</b> She is not necessarily getting bigger maybe but she is growing mentally” “I do play with her sometimes and sort of through her up and down”
<b>Cognitive Development</b>	Referral to infant’s cognitive/ mental development	Mentioning of presence or absence of any cognitive abilities in baby, such as recognizing parents, interested in things, understanding	<b>Include:</b> understanding, recognizes, interested in <b>Exclude:</b> Development related to other areas e.g., motor development, language or smiling	<b>Positive</b> “She recognises both of us and when we have got people or seeing family she is looking out for both of us.” “she is growing mentally” <b>Negative</b> “He is very sort of physically active”
<b>Language Development</b>	Descriptions specifically related to infant’s expressive or receptive language development	Mentioning of presence of or absence of language abilities in baby, such as babbling, making noises,	<b>Include:</b> talking, babbling, cooing, making noises, singing <b>Exclude:</b> General social interaction	<b>Positive</b> “She lights up and talks to us back and even though she’s not got a language she’s cooing she’s making noises she woke up this morning and she was la la laing to herself almost shouting like hello its morning. “ “He is, he is singing trying to express himself. Gurgling noises and he’s sort of blowing noise, trumpet sort of raspberry. He’s doing raspberries”. <b>Negative</b> “She smiles a lot, laughs a lot and enjoys certain things regardless of her mood”.
<b>Smiling/laughing (social development)</b>	Specific description of smiling or laughing	Mentioning of smiling or laughing behaviours or/ and	<b>Include:</b> smile, laugh <b>Exclude:</b> crying or	<b>Positive:</b> “She smiles a lot, laughs a lot and enjoys certain things regardless of her mood”. <b>Negative:</b> “She is crying, there is nothing you can do, she is going to cry”

	behaviours	activities	negative emotions or smiling/ laughing in adult	
<b>II. PARENT</b>				
<b>I. EMOTIONS</b>				
<b>Anger</b>	Angry feelings or behaviour, evidence of strong angry reactions (but not aggression or violence)	Mention of anger levels or angry behaviour in self (parent) directed towards baby, partner or self or others	<b>Include:</b> angry, anger, mad, short temper, <b>Exclude:</b> arguing, physical aggression or violence or anger in baby or others than self	<b>Positive:</b> “I think that I did feel angry with her initially and that is the initial getting tired wishing she was just going to get to sleep and she wasn’t feeding properly. She wouldn’t latch on. Why you stupid baby, why are you the only baby in this whole ward that just won’t feed from me. What a stupid kind of baby.” <b>Negative:</b> “I think she has got a terrible temper.”
<b>Anxiety, worry, stress</b>	Referral to any description of anxious feelings or behaviour	Evidence of anxious feelings or behaviour in self (parent)	<b>Include:</b> anxious, nervous, worried, dread, fear, desperate, stressed <b>Exclude:</b> anxious feelings or behaviours in others (e.g., baby, partner)	<b>Positive:</b> “It was a dread. I would dread to go to sleep. I would dread him like you know. It was absolute fear of going to bed. Fear of the night, fear of his crying, fear of not knowing what to do, so much fear and anxiety.”
<b>Self-blame, guilt</b>	Descriptions of feelings of self-blame, guilt, dislike of self or other negative attribution of self (parent)	Mention of negative feelings towards self, e.g., self-blame, guilt, dislike of self	<b>Include:</b> Self-blame, selfishness, dislike/hate of self, guilt, <b>Exclude:</b> Blame directed towards baby or others (i.e. not related to self)	<b>Positive:</b> “We think maybe we are too selfish and we kept him out probably because it is a nice day, what are we supposed to do. And we sort, we might have colds, if it is sunny we keep in the shade, see the clouds, oh god he has got a cold now. You punish yourself a bit. Let him down really.” “I’ve been looking in the mirror and I hate myself” <b>Negative</b> “Why you stupid baby, why are you the only baby in this whole ward that just won’t feed from me. What a stupid kind of baby.”
<b>Disappointments</b>	Feelings of disappointment in self or baby	Mentioning of being disappointed in own feelings or behaviour baby’s behaviour or character	<b>Include:</b> disappointed with self, baby or others <b>Exclude:</b> positive experiences and feelings (“better than expected”)	<b>Positive</b> “Because I am with him every day we don’t share so much laughter times because it’s functional, you know” <b>Negative</b> “I am surprised in a way that it is not such a burden as I thought it might be”
<b>Exhaustion</b>	Referral to feelings of tiredness and exhaustion	Mention of tiredness, draining, exhaustion, sleep deprivation in self	<b>Include:</b> tired, exhausted, exasperated, sleep, shock, deprived, loss of sleep in self or partner <b>Exclude:</b> any referral of tiredness, exhaustion in baby	<b>Positive</b> “You feel whuuf in the morning times when you are tired. You are tired.” “I think only when we went through the really difficult sleep deprivation, I was really upset” <b>Negative</b> “He didn’t sleep much in the day on his own until recently”
<b>Frustrated, annoyed, irritable</b>	Descriptions of feelings of frustration, annoyance or irritability in parent	Evidence of parent’s own frustration and annoyance	<b>Include:</b> frustrated, irritable, annoyed <b>Exclude:</b> frustration, annoyance or irritability in others (e.g., partner, baby)	<b>Positive</b> “You get a few days of that and you do get frustrated. Because you just think, well what do we do? ... I don’t feel, I feel frustrated because you can’t crack it. ....” “I guess I feel a bit more irritable now if she starts crying at night time, than I used to. I don’t know if that’s normal or not, but you know I’m keen for her to start sleeping through the night.” <b>Negative</b> “She is very irritable at night”

<b>Other feeling (e.g. helplessness) responsibility)</b>	Referral to feelings of helplessness, responsibility etc.	A variety of comments regarding feelings of helplessness, responsibility etc. (not covered by the above areas)	<b>Include:</b> helpless, responsibility <b>Exclude:</b> helplessness etc in others (e.g., partner, baby)	<b>Positive</b> “I just feel helpless, like I can’t do anything.” “I suppose the feeling of helplessness sometimes when nothing will work.” “I think the overwhelming feeling at first was responsibility” <b>Negative</b> “My baby is just so helpless”
<b>Love, happiness, joy</b>	Positive feelings of love, happiness and joy in parent	Mention of positive feelings in self, e.g. love, happiness, joy, content	<b>Include:</b> happy, joyful, content, love <b>Exclude:</b> happiness, joy etc in others (e.g., partner and baby)	<b>Positive</b> “I’d just like to say that I am very happy and everything have been more that I always expect it was going to be and I am very happy to be a mum. Very, very happy.” “I am just really happy that you know that I have become a mother.” <b>Negative</b> “Gosh he is generally a happy baby”
<b>Calm, in control</b>	Descriptions of feelings of calm, in control	Comments related to parental feelings of being in control and staying calm	<b>Include:</b> feelings of calm and in control <b>Exclude:</b> calm feelings etc. in others (e.g., partner or baby)	<b>Positive</b> “I really don’t feel like I’ve felt very angry, that has to do with the calm feeling...” “I’m quite good at controlling my worries and, I don’t really get stressed about things, so I’m fine, I’m fine.” <b>Negative</b> “as a baby she’s pretty calm”
<b>Pride</b>	Descriptions of feelings of pride in baby or self	Evidence of pride in baby or own behaviour/capabilities	<b>Include:</b> pride, proud of, being good at , pleased, <b>Exclude:</b> negative appraisal of baby, self	<b>Positive</b> “I’m very proud to see him sleeping because I’ve learnt that’s a skill sleeping you have to be able to do that so I’m very proud when I see him put himself to sleep People say how gorgeous he is and I feel very proud.” “I’m loving being a father, I think I’m really good at it” <b>Negative</b> “I’ve been looking in the mirror and I hate myself”
<b>2. PARENTAL BEHAVIOUR/RESPONSES</b>				
<b>Impulse</b>	Description of impulse	Referral to any impulsive thoughts directed towards the baby as a consequence of the baby	<b>Include:</b> feelings (felt like) and thoughts (wanted to) and a behaviour (dropping her, run away) <b>Exclude:</b> actual verbal or physical abuse	<b>Positive</b> “I felt like dropping her. On something spikey. I didn’t obviously” <b>Negative</b> “I just got completely exasperated with her and I was actually sort of rough with her, I remember.”
<b>Abuse /Loss of control</b>	Specific mention of abusive behaviour, verbal or physical	Evidence of abusive aggressive behaviour in parent directed towards baby	<b>Include:</b> shouting, rough handling <b>Exclude:</b> thoughts and feelings (i.e. no behaviour)	<b>Positive</b> “It was too much and I was shouting to just shut up, which of course makes it worse, just shouting.” <b>Negative</b> “I felt like dropping her. On something spikey. I didn’t obviously”
<b>3. COPING STRATEGIES</b>				
<b>Support from others (vs. lack of support)</b>	Mention of the presence of or a lack of support from others	Specific mention of presence or absence or need of any type of support (e.g., practical or emotional) from others	<b>Include:</b> Others support, reassurance, help, involvement, interest <b>Exclude:</b> The above related to the partner	<b>Positive</b> “I made sure that I never had a night on my own, even when Paddy was away I had my mum here or friends. Just because I needed that reassurance from someone else around” “I could have gone to the postnatal, prenatal classes in the hospital and gone to the midwives and listened to them and got the real picture, but I really believed I didn’t need their help and I needed it more than I could ever ever imagined. “ <b>Negative</b> “I usually get daddy to hold him down. “

<b>Partner's involvement/ support (vs. lack of support or conflict)</b>	Any mention of partner's involvement and support (or lack of it)	Specific mention of presence or absence of need of any type of support (e.g., practical or emotional) from partner (i.e. mother or father to the baby) Conflict with partner	<b>Include:</b> Presence or absence of partner's support, reassurance, help, interest, involvement etc. (either referral to the father from the mother or vice versa). <b>Exclude:</b> The above when referring to others	<b>Positive</b> "C always changes the nappies, because I am having my child minding course he stays with her, you know." "We usually bath him together. That's my husband, he makes him laugh. Plays the guitar to him." <b>Negative</b> "I made sure that I never had a night on my own, even when Paddy was away I had my mum here or friends. Just because I needed that reassurance from someone else around"
<b>Comparison with others (re baby)</b>	Comparison of own baby in relation to other babies	Referral to any characteristics or behaviours in own baby in comparison with other babies. Both upward and downward comparisons.	<b>Include:</b> better, worse, more, less, the same, like every baby. <b>Exclude:</b> comparisons related to self or other people (not baby)	<b>Positive</b> "She wouldn't latch on. Why you stupid baby, why are you the only baby in this whole ward that just won't feed from me. What a stupid kind of baby." "He is quite a happy baby. Not one of those always happy babies" "But, and then I see a very sick baby and then I try to you know put things in perspective." <b>Negative</b> "How does everyone do it?"
<b>Comparison with others (re self)</b>	Comparison of self in relation to other parents/people	Referral to any characteristics, behaviours or feelings in self in comparison with other parents/people/partner. Both upward and downward comparisons.	<b>Include:</b> better, worse, more, less, the same, like every parent.. <b>Exclude:</b> comparisons purely related to baby	<b>Positive</b> "I am just not massively analytical. Some people constantly think how do I feel, how do I feel, how do I feel, and I'm not like that" "Angry that it got to this stage, when other people weren't experiencing it." Yes, I know people do shake their babies and or other people will shake their babies but no" "I do understand more about parents who shake their babies because I have been frustrated with my own inadequacy a couple of times" "I think that I am probably less capable reading her than Esther is" <b>Negative</b> "She never cries, she, well sometimes, you know like every baby"
<b>Reflections of own reactions (making sense)</b>	Reflections of own reactions (emotional, behaviour or physical)	Any evidence of "self-reflective comments used to "make sense" of how a person feels or behaves or of the situation	<b>Include:</b> I think, I feel, because of,	<b>Positive</b> "And I think there is a part there, laziness. Where I get a bit frightened. Where do I put this then? I think there is, I think there is a mixture of all things." "I think it is inner turmoil. I don't get angry with my baby or myself it is inner turmoil, what I think I should be doing"
<b>4. PARENTHOOD GENERAL</b>				
<b>Positive parenthood experiences</b>	Expression of positive parenthood experiences	Mention of any general or specific aspects of positive experiences of parenthood	<b>Include:</b> enjoy, like, love, feel lucky, fortunate, happy <b>Exclude:</b> scared, worried, concerned, unhappy etc.	<b>Positive</b> "I'm loving being a father, I think I'm really good at it" "I just feel that we have been so lucky with it all really" "I am just really happy that you know that I have become a mother. And I think, there was a bit in my life where I sort of thought, I might not have children. And now I just think, ohh, I think until you actually got a baby you don't know what it's like. You don't know what it's like. Yes I'm really happy." <b>Negative</b> "I'm still scared of child birth because I've not done it the normal way as they say my biggest concern is about my boy shape and it worries me." "I should be looking at a colourful, a view of a colourful view of life, but I'm not at the moment." "I don't feel proud of anything at the moment. I am out of work." "I don't think you can prepare for sleep deprivation and I miss the support of not having, I can't just pop him round his grandmothers and leave him there for a few hours he is just constantly with me."
<b>Negative parenthood</b>	Expression of negative	Mention of any general or	<b>Include:</b> scared, worried,	<b>Positive</b> "I'm still scared of child birth because I've not done it the normal way as they say

<b>experiences</b>	parenthood experiences	specific aspects of negative experiences of parenthood	unhappy, concerned etc. <b>Exclude:</b> enjoy, like, love, feel lucky, fortunate, happy etc.	my biggest concern is about my boy shape and it worries me.” “I should be looking at a colourful, a view of a colourful view of life, but I’m not at the moment.” “I don’t feel proud of anything at the moment. I am out of work.”“I don’t think you can prepare for sleep deprivation and I miss the support of not having, I can’t just pop him round his grandmothers and leave him there for a few hours he is just constantly with me.” <b>Negative</b> “I’m loving being a father, I think I’m really good at it” “I just feel that we have been so lucky with it all really” “I am just really happy that you know that I have become a mother. And I think, there was a bit in my life where I sort of thought, I might not have children. And now I just think, ohh, I think until you actually got a baby you don’t know what it’s like. You don’t know what it’s like. Yes I’m really happy.”
<b>Expectations better (than thought)</b>	Comment about any part of the experience of parenthood which is better than expected	Mention of any aspect of the experience of parenthood exceeding the expectations	<b>Include:</b> better, more, easier than expected <b>Exclude:</b> worse, false expectations	<b>Positive</b> “I’d just like to say that I am very happy and everything have been more that I always expect it was going to be and I am very happy to be a mum. Very, very happy.” “It is even better than I thought that it would be, just the loving, the when they love you back. When they need you.” <b>Negative</b> “I thought it was going to be easier than this. And everyone warns you but you think ohh, I’m going to have a good life. I was very naïve. Very naïve.”“It is the naivety pre-birth. A kind of a false expectation is set up generally to these courses provided. Yeh, you know it is just going to be amazing and easy and you are going to be fine and actually the majority of cases it isn’t and I feel, yeh, very naïve.”
<b>Expectations worse (than thought)</b>	Comment about any part of the experience of parenthood which is worse than expected	Mentioning of any aspect of the experience of parenthood falling below the expectations	<b>Include:</b> worse, false expectations, thought it was going to be easier <b>Exclude:</b> better, easier than expected	<b>Positive</b> “I thought it was going to be easier than this. And everyone warns you but you think ohh, I’m going to have a good life. I was very naïve. Very naïve.” “It is the naivety pre-birth. A kind of a false expectation is set up generally to these courses provided. Yeh, you know it is just going to be amazing and easy and you are going to be fine and actually the majority of cases it isn’t and I feel, yeh, very naïve.” <b>Negative</b> “I’d just like to say that I am very happy and everything have been more that I always expect it was going to be and I am very happy to be a mum.” “It is even better than I thought that it would be, just the loving, the when they love you back.”
<b>Changes in “self”</b>  <b>Present</b>  <b>Absent</b>	Comments related to changes of the “self” of the parent	Referral to presence or absence of both positive and negative changes in any aspects of the self (of the parent), e.g., behaviour, thoughts, emotions, relationships	<b>Include:</b> change, develop become more, <b>Exclude:</b> any external changes not related to the self (e.g., moving house)	<b>Positive</b> “I think that I have become a little bit more assertive. Eating in a restaurant when something is not right sometimes you let it go, sometimes like this is not right. So I think that I have been a little bit more not necessarily in a restaurant but just in life generally. Not putting up with any crap.” “It’s really giving me a lot of wisdom, made me more selfless, not so selfish, less self-indulgent and over obsessive by my own needs. I think it’s been really positive. But that’s today.” “I am a much more patient person than I used to be.”
<b>Parenthood efficacy</b>	Appraisal of own ability	Appraisals of own abilities, both positive and negative	<b>Include:</b> I think I am good, bad, justified	<b>Positive</b> “I’m loving being a father, I think I’m really good at it”
<b>Social expectations</b>	Comments related to societies or others expectations regarding parenting	Mentioning of expectations of others or societal beliefs in relation to own experience (both positive and negative)	<b>Include:</b> expect, look at you, I believed that,	<b>Positive</b> “Yeah I guess at times I sort of feel oh, that I would feel this overwhelming love for him and I guess that is perhaps because you are expected to feel like, yeah” “it is not the Hollywood fairy tale of how it is like being a father you know, so that is disappointing but then you can’t be the perfect dad twenty four seven, it can’t be done.” “I know how judgemental people can be and I don’t want those things to cause a problem”

<b>III. PARENT AND BABY</b>				
<b>I. PARENT -BABY RELATIONSHIP</b>				
<b>Social interaction (parent- baby)</b>	Direct social interaction between the parent (s) and baby	Referral to any activity that involves a direct social interaction between the baby and parent (s).	<b>Include:</b> interact, play together <b>Exclude:</b> any interaction which does not include the direct interaction between the parent and the baby e.g., other people	<b>Positive</b> “I really enjoy bathing her because she really enjoys that and she interacts a lot when she is in the bath you know sort of splashing, and splash she will do it again” “She likes to be tickled and she likes being sung to, row, row, row your boat and other songs. And little piggies and things she starts to anticipate things.” “I love just playing with her and making silly noises. I like it when you have the kind of talking thing where you make a noise and she likes and makes a noise and “ <b>Negative:</b> “I love walking with him and being with other people and interacting with good friends and other babies is fantastic” “I think, he likes when we go and meet the other babies. That’s always a really good time. I think he starts to get quite bored here. Don’t you like other babies (speaking to baby). Just everything else like going out, pushing the pram and he gets a lot of attention”
<b>Bonding: Present / Absent</b>	Any comments that directly relates to bonding between parent and baby	Mention of presence or absence of bonding attachment or close emotional connection between parent and baby	<b>Include:</b> bonding, attachment, emotionally close, connected <b>Exclude:</b> pure physical contact	<b>Positive</b> “I feel quite happy I think. I feel that we have bonded.” “So he is not, he doesn’t seem to be emotionally, over emotionally attached in that sense.” <b>Negative</b> “That physical contact, hugging, is lovely.”
<b>Love at first sight instant love</b>	Description of love for baby as being instant	Mention of instant love for baby	<b>Include:</b> love at first sight	<b>Positive</b> “That first second, the second you see her and it just goes but it’s been there from that first second, I can’t imagine my life without her now”. “Just to hear her. That was lovely, just to hear her. I can’t explain it”. “It was straight away when I saw her for the first time”. <b>Negative</b> “It is hard because, really it is still building and I think probably within a week, I did feel that I was starting to know this little thing but not still hadn’t developed a relationship it just took time, it is difficult to kind of pinpoint when it is just gradually building.”
<b>Love: development over time</b>	Description of love for baby as developing over time	Mention of love needing time to develop and grow	<b>Include:</b> taking time to develop, more and more <b>Exclude:</b> straight away, instant	<b>Positive</b> “It is hard because, really it is still building and I think probably within a week, I did feel that I was starting to know this little thing but not still hadn’t developed a relationship it just took time, it is difficult to kind of pinpoint when it is just gradually building.” <b>Negative</b> “That first second, the second you see her and it just goes but it’s been there from that first second, I can’t imagine my life without her now”. “Just to hear her. That was lovely, just to hear her. I can’t explain it”. “It was straight away when I saw her for the first time”.
<b>Separation : miss baby</b>	Description of parental feelings of missing baby when apart	Mention of missing baby when apart	<b>Include:</b> miss, long for, think about <b>Exclude:</b> enjoy being apart, relieved, free	<b>Positive</b> “I really miss her and I think about her and when I come home all I wanna is hug her”. “I still think about her and miss her”. “I think I do miss him much you know. Coming back and seeing him there. I think he has changed a bit, I think oh, I miss that, changing in the 8 hours I’ve been gone, the 9 hours at work, he’s changed and you know, he doesn’t recognise me straight away”
<b>Separation : not miss baby</b>	Any comment which indicates that the parent	Specific mention of not missing baby, but instead feeling	<b>Include:</b> enjoy being apart, relieved, free	<b>Positive</b> “I enjoy it because it’s very sporadic”



	feels happy to be apart from baby	relieved, happy, free	<b>Exclude:</b> miss, long for, think about	<b>Negative</b> “I really miss her and I think about her”
<b>Feeling trapped</b>	Any aspects of parent’s feelings of being trapped	Evidence of feelings of being trapped by baby	<b>Include:</b> trapped, stuck with, limited by, wanting to get away <b>Exclude:</b> miss, long for, think about	<b>Positive</b> “Yeh, I think that’s it. I still feel quite sort of stuck with her. And that is the biggest negative about breast feeding is that you can’t really, you can’t really get rid of her, but then at the same time it is an excuse not to and so…”
<b>Mind- mindedness Present Understanding /interpreting baby</b>	Parents’ reading/reasoning/ interpretations of their baby’s emotions and behaviours	Evidence of the parent attempting to interpret and understand baby’s emotions and behaviours from the baby’s point of view	<b>Include:</b> I think, reading her/him, I can see, understand <b>Exclude:</b> No attempt to understand baby. Dismissing of needs as attention seeking etc.	<b>Positive</b> “She just woke up which she doesn’t normally do, started crying instantly. Really loudly like proper sobbing her whole body. So I think she had a dream” “I think that I am probably less capable reading her than her mother is, ehm her moods and so on, but I can see quickly when she is beginning to change from one mood to another, it becomes pretty obvious” “if she cries, it is because something is wrong with her, that’s the thing” <b>Negative</b> “he just went absolutely mad. That’s a good example of how he gets.”
<b>Mind –mindedness Absent</b>	Parent’s inability to read/reason/interpret their baby’s emotions and behaviours	Evidence of the parent not understanding the baby’s emotions or behaviours	<b>Include:</b> I don’t know what is wrong, I don’t know <b>Exclude:</b> I understand	<b>Positive</b> “He just went absolutely mad. That’s a good example of how he gets.” “you don’t even know what’s wrong so you don’t know whether it’s you know, hungry, tired, needs a burp, needs a nappy change, needs a fart, you just don’t know. And so it’s much more difficult.” <b>Negative</b> “She just woke up which she doesn’t normally do, started crying instantly. Really loudly like proper sobbing her whole body. So I think she had a dream” “I think that I am probably less capable reading her than her mother is, ehm her moods and so on, but I can see quickly when she is beginning to change from one mood to another, it becomes pretty obvious”
<b>Physical play</b>	Descriptions of play related to active physical activities	Mention of any physical active interactive play activity between baby and parent (or other person)	<b>Include:</b> bounce, hold up in air, swimming, tickle <b>Exclude:</b> cuddle, kiss, baby massage	<b>Positive</b> “Tickle his feet and blow on them and lick his toes. I play peek-a-boo, hide behind a pillow for him. I bounce him up and down on the bed. He’s got a trampoline and he is lying on his back or even on the settee. And then he can sort of holding my arms and drop, holding my arms actually” <b>Negative</b> “She just needs to be cuddled, and rocked, and kissed”
<b>Intimacy &amp; contact</b>	Description of activity related to close physical contact and intimacy	Referral to activity, mainly passive and calm where parent and baby are sharing a close physical contact and intimacy	<b>Include:</b> cuddle, kiss, baby massage, tickle? , feed  <b>Exclude:</b> bounce, hold up in air, swimming	<b>Positive</b> “she just needs to be cuddled, and rocked, and kissed”, “I come home all I wanna do is hug her” <b>Negative</b> “Tickle his feet and blow on them and lick his toes. I play peek-a-boo, hide behind a pillow for him. I bounce him up and down on the bed. He’s got a trampoline and he is lying on his back or even on the settee. And then he can sort of holding my arms and drop, holding my arms actually”
<b>Socialising with others (going out &amp; about)</b>	Activities that involve going out and about or meeting other people	Mention of activities that involve meeting others people, outside the immediate family unit.	<b>Include:</b> friends, other babies, going out, walking with him, show off to others, get attention from others, being with others <b>Exclude:</b> activities limited to parent and baby	<b>Positive</b> “I love walking with him and being with other people and interacting with good friends and other babies is fantastic” “I think, he likes when we go and meet the other babies. That’s always a really good time. I think he starts to get quite bored here. Don’t you like other babies (speaking to baby). Just everything else like going out, pushing the pram and he gets a lot of attention” <b>Negative</b> “I love just playing with her and making silly noises. I like it when you have the kind of talking thing where you make a noise and she likes and makes a noise”

## Appendix B: NHS Ethical Approval for Sussex Journey to Parenthood (JTP) Study (Article 3 & 4)



### National Research Ethics Service

#### Brighton West Research Ethics Committee

Brighton & Hove City Teaching PCT  
2nd Floor, Prestamex House  
171-173 Preston Road  
Brighton  
East Sussex  
BN1 6AG

Telephone: 01273 545373  
Facsimile: 01273 545372

11 September 2007

Dr Susan Ayers  
Senior Lecturer in Health Psychology  
University of Sussex  
Falmer  
Brighton  
East Sussex  
BN1 9QH

Dear Dr Ayers

**Full title of study:** Adjustment to Parenthood, Mental Health, and Parent-Infant Interaction  
**REC reference number:** 07/H1111/56

Thank you for your letter of 30 August 2007, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

#### Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

#### Ethical review of research sites

The Committee has designated this study as exempt from site-specific assessment (SSA). There is no requirement for other Local Research Ethics Committees to be informed or for site-specific assessment to be carried out at each site.

#### Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

#### Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Application	2	20 June 2007
Investigator CV		

This Research Ethics Committee is an advisory committee to South East Coast Strategic Health Authority  
The National Research Ethics Service (NRES) represents the NRES Directorate within  
the National Patient Safety Agency and Research Ethics Committees in England

Protocol	1	04 July 2007
Covering Letter		28 June 2007
Letter from Sponsor		22 June 2007
Peer Review		
Participant Information Sheet: -Pack 1	2	02 August 2007
Participant Consent Form: (Pack 1)	1	04 July 2007
Response to Request for Further Information		02 August 2007
Response to Request for Further Information		30 August 2007
Pack 2 - 3 months after birth - Hospital Anxiety and Depression Scale, Significant other scale, Division of labour, Changes in outlook questionnaire, Dyadic Adjustment Scale (completed during home visit)	1	04 July 2007
Pack 1 - Demographic Questionnaire, Relationship history, Pregnancy details, Expectations of Birth, Adult attachment questionnaire, Dyadic Adjustment Scale, Division of Labour, Perceived stress scale,		04 July 2007
Pack 1 - Hospital Anxiety and depression scale, Significant other scale, PTSD Diagnostic Scale, Debriefing and positive mood items	1	04 July 2007
Pack 2 - 3 months after birth - Reminder letter	1	04 July 2007
Pack 2 - three months after birth - Experience of Birth, PTSD Diagnostic scale, Infant temperament questionnaire, Parental bonding questionnaire, Previewed Stress Scale	1	04 July 2007
Pack 2- appointment letter (sent before home visit)	1	04 July 2007
Questionnaires for Men - Pack 1 - Demographic information, expectations of birth; Pack 2 - experience of birth	1	04 July 2007
Thank you letter to participant	1	02 August 2007
Letter from Funder		19 March 2007
Recruitment Poster/Advert	1	04 July 2007
CVs of Dr Bradley, Alison Pike, Donna Jessop & Elizabeth Ford		
Reminder letter (pack 1)	1	04 July 2007
Cover letter if questionnaires are posted (pack 1)	1	04 July 2007

### R&D approval

All researchers and research collaborators who will be participating in the research at NHS sites should apply for R&D approval from the relevant care organisation, if they have not yet done so. R&D approval is required, whether or not the study is exempt from SSA. You should advise researchers and local collaborators accordingly.

Guidance on applying for R&D approval is available from  
<http://www.rdforum.nhs.uk/rdform.htm>.

### Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

### Feedback on the application process

Now that you have completed the application process you are invited to give your view of the service you received from the National Research Ethics Service. If you wish to make your views known please use the feedback form available on the NRES website at:

<https://www.nresform.org.uk/AppForm/Modules/Feedback/EthicalReview.aspx>

**We value your views and comments and will use them to inform the operational process and further improve our service.**

<b>07/H1111/56</b>	<b>Please quote this number on all correspondence</b>
--------------------	---

With the Committee's best wishes for the success of this project

Yours sincerely



*Dr Andrew Nayagam*  
**Dr Andrew Nayagam**  
**Chair**

Email: [nischinth.cherodian@bhcpct.nhs.uk](mailto:nischinth.cherodian@bhcpct.nhs.uk)

*Enclosures: Standard approval conditions*

Copy to: Mr Paul Richardson  
Brighton and Sussex University Hospitals NHS Trust  
Brighton

Sponsor and R&D for lead site

<https://www.nresform.org.uk/AppForm/Modules/Feedback/EthicalReview.aspx>

**We value your views and comments and will use them to inform the operational process and further improve our service.**

<b>07/H1111/56</b>	<b>Please quote this number on all correspondence</b>
--------------------	---

With the Committee's best wishes for the success of this project

Yours sincerely



*Dr Andrew Nayagam*  
**Dr Andrew Nayagam**  
**Chair**

Email: [nischinth.cherodian@bhcpct.nhs.uk](mailto:nischinth.cherodian@bhcpct.nhs.uk)

*Enclosures: Standard approval conditions*

Copy to: Mr Paul Richardson  
Brighton and Sussex University Hospitals NHS Trust  
Brighton

Sponsor and R&D for lead site

## Appendix C: NHS Ethical Approval for Substantial Amendment of the Sussex Journey to Parenthood (JTP) Study (Article 1 & 2)



### National Research Ethics Service

Brighton West Research Ethics Committee

Brighton & Hove City Teaching PCT  
2nd Floor, Prestamex House  
171-173 Preston Road  
Brighton  
East Sussex  
BN1 6AG

Tel: 01273 545371  
Fax: 01273 545372

13 March 2008

Dr Susan Ayers  
Senior Lecturer in Health Psychology  
Falmer  
Brighton  
East Sussex  
BN1 9QH

Dear Dr Ayers

**Study title:** Adjustment to Parenthood, Mental Health, and Parent-Infant Interaction  
**REC reference:** 07/H1111/56  
**Amendment number:** AM02  
**Amendment date:** 14 February 2008

The above amendment was reviewed at the meeting of the Sub-Committee of the REC held on 29 February 2008.

#### Ethical opinion

The members of the Committee present gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

#### Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Protocol		
Participant Information Sheet		
Participant Consent Form		
Notice of Substantial Amendment (non-CTIMPs)		14 February 2008
Letter of invitation to participant		
Investigator CV		14 February 2008
Interview Schedules/Topic Guides		
Covering Letter		14 February 2008

#### Membership of the Committee

This Research Ethics Committee is an advisory committee to South East Coast Strategic Health Authority  
*The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England*

**Brighton West Research Ethics Committee****Attendance at Sub-Committee of the REC meeting on 29 February 2008**

<i>Name</i>	<i>Profession</i>	<i>Capacity</i>
Dr Duncan Angus	Consultant Psychiatrist	Expert
Dr Jeremy Quiney	Consultant Chemical Pathologist	Expert

The members of the Committee who were present at the meeting are listed on the attached sheet.

**R&D approval**

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

**Statement of compliance**

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

07/H1111/56:

Please quote this number on all correspondence

Yours sincerely



**Mrs Charlotte Graham**  
**Committee Co-ordinator**

E-mail: [charlotte.graham@bhcpct.nhs.uk](mailto:charlotte.graham@bhcpct.nhs.uk)

Enclosures

List of names and professions of members who were present at the meeting and those who submitted written comments

Copy to:

DR PAUL RICHARDSON,  
R&D office for NHS care organisation at lead site



## Appendix D: NHS Ethical Approval for Child Development Study (Article 5)



### National Research Ethics Service

#### Brighton East Research Ethics Committee

Brighton & Hove City Teaching PCT  
2nd Floor, Prestamex House  
171-173 Preston Road  
Brighton  
East Sussex  
BN1 6AG

Telephone: 01273 545373  
Facsimile: 01273 545372

13 August 2008

Dr Susan Ayers  
Senior Lecturer in Health Psychology, Sussex University  
University of Sussex  
Falmer  
Brighton  
East Sussex  
BN7 3PA

Dear Dr Ayers

**Full title of study:** PARENTAL MENTAL HEALTH FOLLOWING CHILDBIRTH:  
IMPACT ON THE PARENT-INFANT INTERACTION AND  
CHILD'S DEVELOPMENT.  
**REC reference number:** 08/H1107/97

Thank you for your letter of 05 August 2008, responding to the Committee's request for further information on the above research and submitting revised documentation, subject to the conditions specified below.

The further information has been considered on behalf of the Committee by the Vice-Chair.

#### Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

#### Ethical review of research sites

The Committee has designated this study as exempt from site-specific assessment (SSA). There is no requirement for [other] Local Research Ethics Committees to be informed or for site-specific assessment to be carried out at each site.

#### Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission at NHS sites ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements.

This Research Ethics Committee is an advisory committee to South East Coast Strategic Health Authority  
The National Research Ethics Service (NRES) represents the NRES Directorate within  
the National Patient Safety Agency and Research Ethics Committees in England

Guidance on applying for NHS permission is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

### Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Application		16 June 2008
Investigator CV		
Protocol	1	
Covering Letter		16 June 2008
Participant Information Sheet	2	05 August 2008
Response to Request for Further Information		05 August 2008
CV of Ylva Parfitt		
Consent form	1	
The perceived stress scale		
The postpartum bonding questionnaire		
Infant behaviour questionnaire		
The Dyadic Adjustment Scale		
Hospital Anxiety Depression Scale		
Bayley Scales of Infant and Toddler Development - Social-Emotional & Adaptive Questionnaire	3 Edition	
Bayley Scales of Infant and Toddler Development	3 Edition	
Who does what scale		
The significant other scale		
The posttraumatic stress diagnostic scale		
Bayley Scales of Infant and Toddler Development - Caregiver	3 Edition	
Invitation letter to participant	2	05 August 2008

### Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

### After ethical review

Now that you have completed the application process please visit the National Research Ethics Website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Progress and safety reports
- Notifying the end of the study

08/H1107/97

Page 3

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

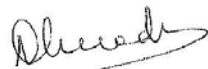
We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email [referencegroup@nres.npsa.nhs.uk](mailto:referencegroup@nres.npsa.nhs.uk).

08/H1107/97

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project

Yours sincerely



PP **Chair**  
**Dr Paul Seddon**

Email: [nischinth.cherodian@bhcpcct.nhs.uk](mailto:nischinth.cherodian@bhcpcct.nhs.uk)

*Enclosures:* "After ethical review – guidance for researchers"

*Copy to:* Professor Jennifer Rusted  
Professor of Experimental Psychology  
Psychology Department  
University of Sussex  
Falmer, Brighton  
BN1 9QH

Mrs Y Parfitt  
DPhil Student  
Department of Psychology  
University of Sussex  
Falmer  
Brighton

## **Appendix E: Demographic and Obstetric Questionnaire – completed in late pregnancy (used in Articles 3, 4 and 5)**

### **Your Background**

*In this section we ask information about you, your work, relationship, pregnancy, and expected childcare arrangements. This information will be confidential and anonymous.*

### **Information About You**

- 1 Your date of birth\_\_\_\_\_ Age last birthday\_\_\_\_\_
- 2 Which of the following best describes your ethnicity? *(please tick one box only)*
  - ☐ White European
  - ☐ African
  - ☐ Afro-Caribbean
  - ☐ Bangladeshi
  - ☐ Chinese
  - ☐ Indian
  - ☐ Pakistani
  - ☐ Mixed race (please describe)
  - ☐ Other (please describe)\_\_\_\_\_
- 3 What is your marital status? *(please tick one box only)*
  - ☐ married
  - ☐ living with your partner
  - ☐ have a boyfriend but not living together
  - ☐ separated
  - ☐ divorced
  - ☐ single
  - ☐ widowed
- 4 Who do you live with? *(please tick one box only)*
  - ☐ husband/partner
  - ☐ husband/partner & children
  - ☐ parents
  - ☐ friends
  - ☐ just your children
  - ☐ alone
- 5 Where do you live? *(please tick one box only)*
  - ☐ council rented
  - ☐ own home
  - ☐ private rented
  - ☐ hostel
  - ☐ bed & breakfast
  - ☐ live in job

6 What educational qualifications do you have? *(please tick all that apply)*

- ☐ None  
☐ CSE's / O levels / GCSE's  
☐ A levels  
☐ City & Guilds  
☐ Diploma  
☐ Undergraduate degree  
☐ Postgraduate degree  
☐ Professional qualification (please specify)\_\_\_\_\_

### About your work

8 What job do you do, or did you do before getting pregnant? (for women). What job do you do (for men)  
(If you did not work please skip to question 14)

Job title:
Type of business:

9 Is/was your job:

Full-time ☐

Part-time ☐

How many hours a week do you work, on average? \_\_\_\_\_ hours

10 Of the following, which best describes you at work? *(please tick one box only)*

☐ Manager

☐ Employee

☐ Self-employed - with employees

☐ Foreman

☐ Apprentice

☐ Self-employed - with no

employees

11 Are you currently on maternity/paternity leave?

☐ Yes

☐ No

12 At how many weeks pregnant did you start, or are you planning to start, your maternity leave? (for women only) \_\_\_\_\_ weeks

13 Are you planning to return to work or start work after your pregnancy?

☐ Yes

☐ No

If yes, are you planning to return to work:

Full-time ☐

Part-time ☐

How many hours are you planning to work a week, on average? \_\_\_\_\_ hours

How much maternity leave are you planning to take? \_\_\_\_\_ years \_\_\_\_\_ months

- 14 What was your own personal income over the past year (before tax)?  
Please include all sources of income e.g., income from employment, savings, profit from any rental properties etc. (*please tick one box only*)

☐ less than 9,999

☐ between £10,000 and £19,999

☐ between £20,000 and £29,999

☐ between £30,000 and £39,999

☐ between £40,000 and £49,999

☐ more than £50,000

### About your relationship

- 1 How long have you and your current partner been together? \_\_\_\_\_ years \_\_\_\_\_ months

- 2 Do you and your current partner live together?

☐ Yes

☐ No

If yes, how long have you been living together? \_\_\_\_\_ years \_\_\_\_\_ months

### About your pregnancy

- 1 Was your current pregnancy planned?

☐ Yes

☐ No

If yes, how long did it take for you to become pregnant once you had decided to have a baby? \_\_\_\_\_ years \_\_\_\_\_ months

- 2 Did you or your partner need fertility treatment?

☐ Yes

☐ No

If yes, please give details:

- 3 What is your expected date of delivery?

*Please read the following questions about your pregnancy and circle one response for each question. You may circle any number on the scale, where circling 1 would*

*indicate that you strongly agree with the response on the left hand side and circling 7 would indicate that you strongly agree with the response on the right hand side.*

4 Before you knew you were pregnant, how much did you want a baby?

Not at all      1      2      3      4      5      6      7      Very much  
all

5 How planned was this pregnancy?

Not at all      1      2      3      4      5      6      7      Completely  
Planned      Planned

6 When you found out you were pregnant/your partner was pregnant, what phrase best describes your feelings?

*(please tick one box)*

- ☐ you were very happy and had strongly positive feelings
- ☐ you were generally positive but had some negative feelings
- ☐ you were indifferent, or uncertain with mixed feelings
- ☐ you were generally negative, but had some positive feelings
- ☐ you were upset and had strongly negative feelings

7 What sex baby do you hope for? *(please tick one box)*

- ☐ strongly want a girl
- ☐ want a girl
- ☐ have no preference
- ☐ want a boy
- ☐ strongly want a boy

8 How many miscarriages have you had (women only)? \_\_\_\_\_

9 How many terminations (planned abortions) have you had (women only)? \_\_\_\_\_

10 How many still births have you had (women only)? \_\_\_\_\_

### **Experience of birth (completed at 3 months postpartum)**

This section asks about the labour and birth of your baby.

1. How was your baby born?

- ☐ Normal delivery
- ☐ Assisted delivery (e.g., forceps)
- ☐ Emergency caesarean
- ☐ Elective caesarean

**Appendix F: Hospital Anxiety and Depression Scale - completed in late pregnancy, 3 months and 15 months postpartum (used in Articles 3 and 4)**

*This section looks at how you feel. Please tick the box next to the reply which comes closest to how you have been feeling in the past week. Don't take too long over your answers - your immediate reaction to each item will probably be more accurate than a long thought-out response.*

1. I feel tense or wound up

- |   |  |  |                                     |
|---|--|--|-------------------------------------|
| <input type="checkbox"/> Most of the time | <input type="checkbox"/> A lot of the time | <input type="checkbox"/> From time to time, occasionally | <input type="checkbox"/> Not at all |
|---|--|--|-------------------------------------|

2. I still enjoy the things I used to enjoy

- |   |  |  |  |
|---|--|--|--|
| <input type="checkbox"/> Definitely as much | <input type="checkbox"/> Not quite so much | <input type="checkbox"/> Only a little | <input type="checkbox"/> Hardly at all |
|---|--|--|--|

3. I get a sort of frightened feeling as if something awful is about to happen

- |  |   |  |                                     |
|--|---|--|-------------------------------------|
| <input type="checkbox"/> Very definitely and quite badly | <input type="checkbox"/> Yes, but not too badly | <input type="checkbox"/> A little, but it doesn't worry me | <input type="checkbox"/> Not at all |
|--|---|--|-------------------------------------|

4. I can laugh and see the funny side of things

- |  |  |   |                                     |
|--|--|---|-------------------------------------|
| <input type="checkbox"/> As much as I always could | <input type="checkbox"/> Not quite so much now | <input type="checkbox"/> Definitely not so much now | <input type="checkbox"/> Not at all |
|--|--|---|-------------------------------------|

5. Worrying thoughts go through my mind

- |   |  |   |  |
|---|--|---|--|
| <input type="checkbox"/> A great deal of the time | <input type="checkbox"/> A lot of the time | <input type="checkbox"/> From time to time, but not too often | <input type="checkbox"/> Only occasionally |
|---|--|---|--|

6. I feel cheerful

- |   |                                    |                                    |                                     |
|---|------------------------------------|------------------------------------|-------------------------------------|
| <input type="checkbox"/> Most of the time | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Not often | <input type="checkbox"/> Not at all |
|---|------------------------------------|------------------------------------|-------------------------------------|

7. I can sit at ease and feel relaxed

- |                                     |                                  |                                    |                                     |
|-------------------------------------|----------------------------------|------------------------------------|-------------------------------------|
| <input type="checkbox"/> Definitely | <input type="checkbox"/> Usually | <input type="checkbox"/> Not often | <input type="checkbox"/> Not at all |
|-------------------------------------|----------------------------------|------------------------------------|-------------------------------------|

8. I feel as if I am slowed down

- |  |                                     |                                    |                                     |
|--|-------------------------------------|------------------------------------|-------------------------------------|
| <input type="checkbox"/> Nearly all the time | <input type="checkbox"/> Very often | <input type="checkbox"/> Sometimes | <input type="checkbox"/> Not at all |
|--|-------------------------------------|------------------------------------|-------------------------------------|

9. I get a sort of frightened feeling like 'butterflies' in the stomach

- |  |                                      |                                       |                                     |
|--|--------------------------------------|---------------------------------------|-------------------------------------|
| <input type="checkbox"/> Nearly all the time | <input type="checkbox"/> Quite often | <input type="checkbox"/> Occasionally | <input type="checkbox"/> Not at all |
|--|--------------------------------------|---------------------------------------|-------------------------------------|

10. I have lost interest in my appearance

- |                                     |  |  |   |
|-------------------------------------|--|--|---|
| <input type="checkbox"/> Definitely | <input type="checkbox"/> I don't take as much care as I should | <input type="checkbox"/> I may not take quite as much care | <input type="checkbox"/> I take just as much care as ever |
|-------------------------------------|--|--|---|



11. I feel restless as if I have to be on the move  
☐ Very much indeed      ☐ Quite a lot      ☐ Not very much      ☐ Not at all
12. I look forward with enjoyment to things  
☐ As much as I ever did      ☐ Rather less than I used to      ☐ Definitely less than I used to      ☐ Hardly at all
13. I get sudden feelings of panic  
☐ Very often indeed      ☐ Quite often      ☐ Not very often      ☐ Not at all
14. I can enjoy a good book or radio or TV programme  
☐ Often      ☐ Sometimes      ☐ Not often      ☐ Very seldom

**Appendix G: The Postpartum Bonding Questionnaire (PBQ) - completed at 3 months and 15 months postpartum (used in Article 3).**

*This section looks at your relationship with your baby. There are no right or wrong answers. Choose the answer when seems right in your present experience. All your answers are confidential and anonymous, and your relationship will not be judged in any way.*

Please indicate how often the following are true for you:

	Always	Very often	Quite often	Some times	Rarely	Never
1. I feel close to my baby	0	1	2	3	4	5
2. I wish the old days would come back when I had no baby	0	1	2	3	4	5
3. I feel distant from my baby	0	1	2	3	4	5
4. I love to cuddle my baby	0	1	2	3	4	5
5. I regret having this baby	0	1	2	3	4	5
6. The baby does not seem to be mine	0	1	2	3	4	5
7. My baby winds me up	0	1	2	3	4	5
8. My baby irritates me	0	1	2	3	4	5
9. I feel happy when my baby smiles or laughs	0	1	2	3	4	5
10. I love my baby to bits	0	1	2	3	4	5
11. I enjoy playing with my baby	0	1	2	3	4	5
12. My baby cries too much	0	1	2	3	4	5
13. I feel trapped as a mother/father	0	1	2	3	4	5
14. I feel angry with my baby	0	1	2	3	4	5
15. I resent my baby	0	1	2	3	4	5
16. My baby is the most beautiful baby in the world	0	1	2	3	4	5
17. I wish my baby would somehow go away	0	1	2	3	4	5
18. I have done harmful things to my baby	0	1	2	3	4	5
19. My baby makes me anxious	0	1	2	3	4	5
20. I am afraid of my baby	0	1	2	3	4	5
21. My baby annoys me	0	1	2	3	4	5
22. I feel confident when changing my baby	0	1	2	3	4	5

23.	I feel the only solution is for someone else to look after my baby	0	1	2	3	4	5
24.	I feel like hurting my baby	0	1	2	3	4	5
25.	My baby is easily comforted	0	1	2	3	4	5

**Appendix H: The Infant Characteristics Questionnaire (ICQ) - completed at 3 months and 15 months postpartum (used in Article 3).**

This section asks about your baby. For each of the following questions, please circle the number that represents how you think your baby is. "About average" means how you think the average baby would be scored.

		<b>Very Easy</b>			<b>About average</b>		<b>Difficult</b>	
		1	2	3	4	5	6	7
1.	How easy or difficult is it for you to calm or soothe your baby when she/he is upset?							
2.	How easy or difficult is it for you to predict when your baby will go to sleep and wake up?							
3.	How easy or difficult is it for you to predict when your baby will become hungry?							
4.	How easy or difficult is it for you to know what's bothering your baby when he/she cries or fusses?							

5. How many times per day, on the average, does your baby get fussy and irritable - for either short or long periods of time?

<b>Never</b>	<b>1-2 times per day</b>	<b>3-4 times per day</b>	<b>5-6 times per day</b>	<b>7-9 times per day</b>	<b>10-14 times per day</b>	<b>15+ times per day</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		<b>Very Little; Much less than average</b>		<b>Average amount; Same as the average baby</b>		<b>A lot; Much more than the average baby</b>	
		1	2	3	4	5	6 7
6.	How much does your baby cry and fuss?						

		<b>Very Well: loves it</b>		<b>Neither likes nor dislikes it</b>		<b>Terribly does not like it</b>	
		1	2	3	4	5	6 7
7.	How does your baby respond to his/her first bath?						

		<b>Very favourably: liked it</b>		<b>Neither liked nor disliked it</b>		<b>Very negatively did not like it</b>	
		1	2	3	4	5	6 7
8.	How did your baby respond to his/her first solid food?						

		<b>Almost always responds favourably first</b>		<b>Responds favourably about half the time</b>		<b>Almost always responds negatively at first</b>	
		1	2	3	4	5	6 7

9.	How does your baby typically respond to a new person?	1	2	3	4	5	6	7
10.	How does your baby typically respond to being in a new place?	1	2	3	4	5	6	7
11.	How well does your baby adapt to new situations?	<b>Very well, always likes them eventually</b>		<b>Ends up liking them about half the time</b>		<b>Almost always dislikes them in the end</b>		
		1	2	3	4	5	6	7
12.	How easily does your infant get upset?	<b>Not easily, even by things that upset most babies</b>		<b>About average</b>		<b>Very easily, even by things that don't bother most babies</b>		
		1	2	3	4	5	6	7
13.	When your baby gets upset (e.g., before feeding, during nappy changes etc.), how vigorously or loudly does she/he cry and fuss?	<b>Very mild intensity or loudness</b>		<b>Moderate intensity or loudness</b>		<b>Very loud or intense</b>		
		1	2	3	4	5	6	7
14.	How does your baby react when you are dressing her/him?	<b>Very well Likes it</b>		<b>About average</b>		<b>Does not like it at all</b>		
		1	2	3	4	5	6	7
15.	How active is your baby?	<b>Very calm &amp; quiet</b>		<b>About average</b>		<b>Very active &amp; vigorous</b>		
		1	2	3	4	5	6	7
16.	How much does your baby smile and make happy sounds?	<b>A great deal</b>		<b>About average</b>		<b>Very little</b>		
		1	2	3	4	5	6	7
17.	What kind of mood is your baby generally in?	<b>Very happy &amp; cheerful</b>		<b>Neither serious nor cheerful</b>		<b>Serious</b>		
		1	2	3	4	5	6	7
18.	How much does your baby enjoy playing games with you?	<b>A great deal; loves it</b>		<b>About average</b>		<b>Very little does not like it much</b>		
		1	2	3	4	5	6	7
19.	How much does your baby want to be held?	<b>Wants to be free most of the time</b>		<b>Sometimes will; sometimes won't</b>		<b>A great deal; wants to be held almost all of the time</b>		
		1	2	3	4	5	6	7

		<b>Very favourably; won't get upset</b>		<b>About average</b>		<b>Very unfavourably; gets quite upset</b>	
		1	2	3	4	5	6 7
20.	How does your baby respond to disruptions and changes in the everyday routine, such as when you go to a meeting, on trips, etc.?						
		<b>Very Easy</b>		<b>About average</b>		<b>Difficult</b>	
		1	2	3	4	5	6 7
21.	How easy is it for you to predict when your baby needs a nappy change?						
		<b>Change seldom</b>		<b>About average</b>		<b>Change often</b>	
		1	2	3	4	5	6 7
22.	How changeable are your baby's moods?						
		<b>Very Excited</b>		<b>About average</b>		<b>Not at all</b>	
		1	2	3	4	5	6 7
23.	How excited does your baby become when people play with, or talk to him/her?						
		<b>Very easy</b>		<b>Ordinary; some problems</b>		<b>Highly difficult to deal with</b>	
		1	2	3	4	5	6 7
24.	Please rate the overall degree of difficulty your baby would present for the average parent.						

## Appendix I: The Dyadic Adjustment Scale, DAS - completed in late pregnancy and 15 months postpartum (used in Article 3)

*This section looks at your relationship with your partner. Please answer this section without discussing it with your partner and be as honest as possible. All your answers are confidential and anonymous, and your relationship will not be judged in any way.*

### 1. Agreements and Disagreements

Most people have disagreements in their relationships. Please circle the number next to each statement that best describes the approximate amount of agreement or disagreement between you and your partner.

		Always disagree	Almost always disagree	Frequently disagree	Occasionally disagree	Almost always agree	Always agree
1.	Handling of family finances	0	1	2	3	4	5
2.	Matters of recreation	0	1	2	3	4	5
3.	Religious matters	0	1	2	3	4	5
4.	Demonstration of affection	0	1	2	3	4	5
5.	Friends	0	1	2	3	4	5
6.	Sex relations	0	1	2	3	4	5
7.	Conventionality (correct or proper behaviour)	0	1	2	3	4	5
8.	Philosophy of life	0	1	2	3	4	5
9.	Ways of dealing with parents or in-laws	0	1	2	3	4	5
10.	Aims, goals, and things you believed were important	0	1	2	3	4	5
11.	Amount of time spent together	0	1	2	3	4	5
12.	Making major decisions	0	1	2	3	4	5
13.	Household tasks	0	1	2	3	4	5

14.	Leisure time interests and activities	0	1	2	3	4	5
15.	Career decisions	0	1	2	3	4	5

These are some things about which couples sometimes agree and disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks (tick yes or no).

16. Being too tired for sex ☐ Yes ☐ No
17. Not showing love ☐ Yes ☐ No

## 2. Conflict and Harmony

	All of the time	Most of the time	More often than not	Occasionally	Rarely	Never
1. How often do you discuss or have you considered divorce, separation, or terminating your relationship?	0	1	2	3	4	5
2. How often do you or your partner leave the house after a fight?	0	1	2	3	4	5
3. In general, how often do you think that things between you and your partner are going well?	0	1	2	3	4	5
4. Do you confide in your partner?	0	1	2	3	4	5
5. Do you ever regret that you married (or lived together)?	0	1	2	3	4	5
6. How often do you and your partner quarrel?	0	1	2	3	4	5
7. How often do you and your partner get on each other's nerves?	0	1	2	3	4	5



### 3. Doing things together

How often would you say the following events occur between you and your partner?

	Never	Less than once a month	Once or twice a month	Once or twice a week	Once a day	More often
1. Have a stimulating exchange of ideas	0	1	2	3	4	5
2. Laugh together	0	1	2	3	4	5
3. Calmly discuss something	0	1	2	3	4	5
4. Work together on a project	0	1	2	3	4	5
5. Kiss your partner	Never	Rarely	Occasionally	Almost every day	Every day	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Do you and your partner engage in outside interests together?	None	Very few of them	Some of them	Most of them	All of them	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 4. Happiness and the Future

The boxes below represent different degrees of happiness in your relationship. The middle point, "happy" represents the degree of happiness of most relationships. Please tick the box which best describes the degree of happiness, all things considered, of your relationship.

Extremely Unhappy	Fairly Unhappy	A Little Unhappy	Happy	Very Happy	Extremely Happy	Perfect
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Which of the following statements best describes how you feel about the future of your relationship? (please tick one)

- ☐ I want desperately for my relationship to work and would go to almost any length to see that it does.
- ☐ I want very much for my relationship to succeed, and will do all I can to see that it does.
- ☐ I want very much for my relationship to succeed, and will do my fair share to see that it does.

- ☐ It would be nice if my relationship succeeded, but I can't do much more than I am doing now to help it succeed
- ☐ It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going.
- ☐ My relationship can never succeed, and there is no more that I can do to keep the relationship going.

**Note that the following Scales and Assessments were not included as Appendices, due to copyright restrictions:**

The Posttraumatic Stress Diagnostic Scale (PDS)

The Birmingham Interview for Maternal Mental Health (BIMMH)

The CARE Index Coding Manual

The Bayley Scales of Infant Development III